

DOCUMENT RESUME

ED 328 717

CE 056 881

AUTHOR Moore, Charles G.; And Others
TITLE Facility Maintenance. V-TECS Guide.
INSTITUTION South Carolina State Dept. of Education, Columbia.
Office of Vocational Education.
PUB DATE 90
NOTE 363p.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC15 Plus Postage.
DESCRIPTORS *Building Operation; *Building Trades; Cleaning; Competency Based Education; Criterion Referenced Tests; Electrical Systems; Equipment Maintenance; Facilities; Facility Improvement; Facility Inventory; Hand Tools; Job Performance; *Maintenance; Mechanical Equipment; Occupational Safety and Health; Postsecondary Education; *Repair; Safety Equipment; Secondary Education; State Curriculum Guides; *Trade and Industrial Education

ABSTRACT

This facility maintenance guide is a compilation of duties, tasks, performance objectives, and performance guides that deals with the psychomotor aspect of an occupation. The guide addresses the three domains of learning: psychomotor, cognitive, and affective. Each unit provides job-relevant tasks, standards of performance, source of standard, conditions of performance, enabling objectives, resources, teaching activities, criterion-referenced questions and answers, a practical application, and a checklist for evaluating student performance. The following units are included: (1) perform safe work practices; (2) care for interior surfaces and surface coverings; (3) care for building exterior and grounds; (4) use hand power tools to maintain and repair interior and exterior of buildings; (5) use hand and power tools to maintain and repair the plumbing and water systems; (6) maintain and repair electrical systems; and (7) maintain and repair heating and cooling systems. Five appendices include: (1) task list and job titles; (2) definitions of terms; (3) tools and equipment list; (4) sources of standards (15 entries); and (5) a 49-item bibliography. (NLA)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

V-TECS GUIDE
FOR
FACILITY MAINTENANCE

Prepared by

Charles G. Moore
State Supervisor
Trade and Industrial Education

Roger C. Goupil
Project Coordinator

Robert T. Benson, Ed. D.
Technical Coordinator

SOUTH CAROLINA DEPARTMENT OF EDUCATION

Dr. Charlie G. Williams
State Superintendent of Education

Sidney B. Cooper
Deputy Superintendent
Division of Instruction

Dr. Moody Oswald
Director
Office of Vocational Education

South Carolina Department of Education: An Equal Opportunity Agency
Columbia, South Carolina 29201

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

- ☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Copyright 1990 by V-TECS

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

EL Knight

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

ED328717

18895030
CE056881

ACKNOWLEDGMENTS

The Facility Maintenance V-TECS Guide was developed from the following V-TECS Guides/Catalogs: Janitor Building Repairer, Ornamental Horticulture Production Occupations, and Industrial Maintenance Mechanic and Facility Maintenance, by a committee of Facility Maintenance instructors from South Carolina. Special appreciation is extended to the following teachers who devoted their time and talents to this project:

Lois T. Blackwell
R.D. Anderson AVC
Moore, SC

Tommy C. Farr
Calhoun-Orangeburg
Voc. Ed. Center
Orangeburg, SC

Louis J. Roussel
Darlington Career Center
Darlington, SC

The Office of Vocational Education staff members who assisted the committee were Jim Horton, Trade and Industrial Education Consultant; Shirley Cullen, Sex Equity Consultant; Amy McCaskill, Editor; Barbara Richardson, Word Processing Operator; and Linda Gordon, Word Processing Operator.

Upon completion of the writing of the Facility Maintenance V-TECS Guide, five educators and three incumbent workers were selected to field review the materials for validity and reliability. These individuals are commended for their efforts in assisting with this project:

Edward Jackson
Florence-Darlington TEC
Florence, SC

James Patterson
Maintenance Worker
Darlington, SC

Simon Ferguson
SC School for Deaf and Blind
Spartanburg, SC

Emmanuel Williams
Contractor
Darlington, SC

Mike Green
Daniel Morgan Vocational Center
Spartanburg, SC

Wayne Weathers
Sales Representative
Spartanburg, SC

Andrew Johnson
Birchwood High School
Columbia, SC

William McCall
Darlington Career Center
Darlington, SC

TABLE OF CONTENTS

ACKNOWLEDGMENTS	ii
INTRODUCTION	1
USE OF A V-TECS GUIDE	3
UNIT OUTLINE	
PERFORM SAFE WORK PRACTICES	4
CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS	22
CARE FOR BUILDING EXTERIOR AND GROUNDS	104
USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS	157
USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR THE PLUMBING AND WATER SYSTEMS	252
MAINTAIN AND REPAIR ELECTRICAL SYSTEMS	271
MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS	302
APPENDICES	
A. Task List and Job Titles	339
B. Definitions of Terms	344
C. Tools/Equipment List	350
D. Sources of Standards	354
E. Bibliography	356

INTRODUCTION

A V-TECS Guide is an extension or a continuation of one or more V-TECS Catalogs. The V-TECS Catalog is a composition of duties, tasks, performance objectives, and performance guides which deal with the psychomotor aspect of an occupation. The catalog can be considered the blueprint of an occupation.

The catalog serves as the foundation for the V-TECS Guide. Experience has shown that the art of learning can be taught while teaching subject matter. A V-TECS Guide provides an efficient method for this process. The Guide addresses the three domains of learning: psychomotor, cognitive, and affective. The following is a brief explanation of each.

Psychomotor

Manipulative skills, such as sharpening a pencil and making a bulletin board display, are representative of activities that are psychomotor in nature. These tasks are identified in a catalog and grouped by duties and objectives. Each performance objective has a performance standard which must be met to demonstrate student proficiency in the manipulative aspect of the task.

Cognitive

Cognition is the mental process by which knowledge is acquired. To perform psychomotor tasks, students must think. Effective thinking is necessary for successful performance of job tasks. Students gain cognition through real and vicarious

experiences. This guide enables the instructor to provide decision-making opportunities for students, thus developing their cognitive skills.

Affective

The affective domain deals with attitudes, interests, and values development. Desirable behavior is the learning outcome of the affective domain. This guide presents activities created to promote an understanding of self and others in a working environment. The instructor is encouraged to use the activities to stress how attitudes, values, and goal attainment influence working relationships and productivity.

USE OF V-TECS GUIDE

A V-TECS Guide is designed to provide job-relevant tasks, performance objectives, performance guides, resources, teaching activities, evaluation standards, and criterion-referenced measures. It may be used with any teaching method the instructor chooses. Although a guide contains suggestions for specific classroom activities for each identified task, teachers are encouraged to be creative in adapting the material to meet the particular needs of their students.

PERFORM SAFE WORK PRACTICES

DUTY PERFORM SAFE WORK PRACTICES

PERFORMANCE OBJECTIVE 1

TASK

Construct and erect scaffolds.

STANDARD OF PERFORMANCE OF TASK

When completed, the scaffold ledger, ledger support, legs, planking, and bracing will be safe and securely nailed in accordance with specifications and state construction safety code/regulations.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

A wall, scaffolding lumber (ledger board, ledger support, legs, platform planking, bracing), nails, specifications for work to be done on wall, and the following tools and equipment:

Hammer
Hand saw or portable power saw
Level
Personal safety equipment

Rule or measuring tape
Saw horse or bench
Square
State construction safety
codes/regulations

ENABLING OBJECTIVES

1. Read and interpret construction safety codes.
2. Safely use portable power equipment.
3. Safely use hand tools.
4. Read and interpret specifications and regulations.
5. Demonstrate safe work practices.

RESOURCES

1. Wagner. *Modern Carpentry*, pp. 445-46.
2. Feirer et al. *Carpentry and Building Construction*, pp. 216-17.

TEACHING ACTIVITIES

1. Assign student to read resource material.
2. Explain the difference between common nails and duplex nails.
3. Show how to attach scaffold to wall.
4. Explain the difference between plumb and level.
5. Emphasize use of base plates.
6. Demonstrate to student how to check for rigidity and sway.

PERFORMANCE OBJECTIVE 1

CRITERION-REFERENCED MEASURE

Questions

1. A good scaffold should always have
 - a. base plates.
 - b. bracing.
 - c. planking.
 - d. all of the above
2. The height of scaffold is of little importance. True or False?
3. The scaffold is attached to wall with a(n) _____.
4. In scaffold construction what is the reason duplex nails are used?

Answers

1. d.
2. False
3. ledger board
4. ease of dismantling

Practical Application

Have student construct and erect scaffolds.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 1 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 1

CONSTRUCT AND ERECT SCAFFOLDS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Determined height and length of platform planking needed.		
2. Cut ledger boards and ledger supports to length, if necessary.		
3. Nailed ledger supports to wall.		
4. Nailed ledger boards to ledger supports.		
5. Raised legs and nailed ledger boards to legs. Made sure legs were plumb and ledgers were level. Legs should have been long enough to provide for safety railing(s), if necessary. Placed supports under legs, if necessary, to avoid settling or movement.		
6. Nailed cross braces to legs in form of X's as needed.		
7. Placed platform planking on ledger boards. Nailed, if necessary.		
8. Installed safety railing(s), if necessary.		
9. Checked for rigidity and sway. Added bracing, if necessary.		
10. Cleaned up.		
11. Performed all work in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY PERFORM SAFE WORK PRACTICES

PERFORMANCE OBJECTIVE 2

TASK

Store equipment.

STANDARD OF PERFORMANCE OF TASK

All equipment and its present location must be listed on master sheet; all equipment must be secured in safe, out-of-the-way place; no equipment can be left in an unstable position.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Storage facility for equipment
Various pieces of equipment
List of equipment

ENABLING OBJECTIVES

1. Demonstrate safe working practices according to state requirements for equipment storage.
2. Read and interpret plans and procedures for storage of equipment.
3. Identify equipment in terms of use, department, and location of storage area.
4. Demonstrate ability to store or procure needed equipment from master list.

RESOURCE

Feirer and Hutchings. *Carpentry and Building Construction*, pp. 107-200.

TEACHING ACTIVITIES

1. Discuss purposes of creating a plan for storing equipment.
2. Classify and list equipment according to department and use, i.e.,
 - a. Grounds Equipment
 1. Gasoline powered equipment
 2. Hand tools
 3. Etc.
 - b. Plumbing Repair Equipment
 1. Standard and Phillips screwdrivers
 2. Wrenches
 3. Etc.
 - c. Electrical Repair Equipment
 1. Long nosed pliers
 2. Etc.

PERFORMANCE OBJECTIVE 2

TEACHING ACTIVITIES continued

- d. Other Departments
 1. Sanitation supplies
 2. Floor machines
3. Locate or design and build suitable storage areas according to fire safety rules, sizes, shapes, and frequency of use.
4. Assign peg board activity for organizing small hand tools.
5. Define guidelines for storage of equipment such as damp mops; paper towels; damp sponges; oil treated dust mop wicks; gasoline powered motors; and fasteners such as screws, bolts, nails, etc. Dampness or oil should not penetrate cases of paper products. Damp articles should not be stored next to dust mop wicks.
6. Vacuum cleaners should be stored separately from damp items.

CRITERION-REFERENCED MEASURE

Questions

1. List three pieces of grounds care equipment that should be stored away from main buildings.
2. Two items from the list below that can not be safely stored in cardboard boxes are
 - a. damp sponges
 - b. nails
 - c. treated dust mop wicks
 - d. oily rags
3. Tell whether each of the following statements is true or false:
 - a. Rakes, brooms, mops, and shovels may be stored leaning against the wall close to the door so they are immediately available for quick use.
 - b. Master lists of equipment should be made for quick location of needed items.
 - c. Damp mops and dust mop wicks may be stored together.

Answers

1. Gasoline powered nylon trimmer, lawn mower, and blower--student may list other pieces of equipment which have tanks holding flammable material.
2. c. and d.
3.
 - a. False
 - b. True
 - c. False

PERFORMANCE OBJECTIVE 2

CRITERION-REFERENCED MEASURE continued

Practical Application

Have student store equipment.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 2 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 2

STORE EQUIPMENT

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Listed all equipment to be stored.		
2. Kept equipment belonging to other departments separate.		
3. Designated and listed all storage areas. NOTE: When possible, did not store heavy, bulky equipment in front of equipment getting frequent use.		
4. Placed items in level, stable position.		
5. Where layers were necessary, placed heavy pieces on bottom.		
6. Did not store perishable items in damp, wet areas.		
7. Performed all work in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY PERFORM SAFE WORK PRACTICES

PERFORMANCE OBJECTIVE 3

TASK

List and post safety hazards within building.

STANDARD OF PERFORMANCE OF TASK

All areas having immediate or potential danger must be listed and posted; supervisor must approve list using OSHA rules.

SOURCE OF STANDARD

Strong. *Accident Prevention Manual*, pp. 4-17.

CONDITIONS FOR PERFORMANCE OF TASK

None

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Identify safety hazards within a building.
3. Post proper signs at hazardous sites throughout the building to warn the public of possible danger.

RESOURCE

Feirer and Hutchings. *Carpentry and Building Construction*, pp. 107-10.

TEACHING ACTIVITIES

1. List sanitation regulations concerning housekeeping and food service as required by OSHA: Items 1 through 10.
2. Inspect drinking water fountains for acceptable OSHA standards.
3. Examine all exit doors for proper marking and OSHA standards.
4. Locate and list flammable liquids in the building with flashpoints below 100° F.
5. Construct DANGER signs.

PERFORMANCE OBJECTIVE 3

CRITERION-REFERENCED MEASURE

Questions

1. A waste receptacle should be constructed so that it does not leak and may be thoroughly cleaned and maintained in a sanitary condition. True or False?
2. Trash and rubbish may be left for up to three days if the trash can is not full. True or False?
3. Portable fire extinguishers should be given maintenance service at least once a year. True or False?
4. Flammable liquids should be stored in a plastic bucket. True or False?
5. Wet floor signs should be posted only if the floor remains wet more than fifteen minutes. True or False?

Answers

1. True
2. False
3. True
4. False
5. False

Practical Application

Have student list and post safety hazards within a building.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 3 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 3
LIST AND POST SAFETY HAZARDS WITHIN BUILDING

Student's Name _____ **Date** _____

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Obtained copy of OSHA rules for building.		
2. Listed all possible danger areas using OSHA rules as guidelines.		
3. Constructed DANGER signs to be used on projects of short duration, e.g., mopping, buffing floors, setting ladders, etc.		
4. Using list as guide, posted DANGER signs in proper places.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____ **Date** _____

DUTY PERFORM SAFE WORK PRACTICES

PERFORMANCE OBJECTIVE 4

TASK

Extinguish fires with appropriate fire extinguisher.

STANDARD OF PERFORMANCE OF TASK

Fire must be extinguished with appropriate fire extinguisher before all of the agent is expelled; also, it must be extinguished in a safe manner.

SOURCE OF STANDARD

South Carolina Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Class A, B, C, and D fire extinguishers
Materials to cause Class A, B, C, or D fires

ENABLING OBJECTIVES

1. Describe classifications applicable to different types of fires.
2. Describe conditions that represent a Class A, B, C, or D fire.
3. Identify ways that one may prevent fires.
4. Demonstrate safe firefighting practices.

RESOURCES

1. Naval Training Command. **Builder INC, Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction.**

TEACHING ACTIVITIES

1. Discuss the conditions that relate to different types of fires and the letter designations.
2. Assign reading activities using the school resource center (or library).
3. Assign student to read and report on the various fire extinguishers throughout the school.
4. Invite a representative from the fire department to conduct a demonstration with the various types of fire extinguishers.
5. Assign student to practice putting a fire out with a fire extinguisher.

PERFORMANCE OBJECTIVE 4

CRITERION-REFERENCED MEASURE

Questions

1. Class B fires are those composed of burning _____ such as grease, animal fat, gasoline, oil, etc.
2. Electrical fires are considered Class _____ fires.
3. Class D fires are those fires that are caused by flammable _____.

Answers

1. liquids
2. C
3. metals

Practical Application

Have student extinguish a fire with the appropriate fire extinguisher.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 4 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 4
EXTINGUISH FIRES WITH APPROPRIATE FIRE EXTINGUISHER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Located fire.		
2. Identified type of fire.		
3. Secured the appropriate fire extinguisher.		
4. Directed nozzle at base of fire.		
5. Extinguished fire.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY PERFORM SAFE WORK PRACTICES

PERFORMANCE OBJECTIVE 5

TASK

Carry and place ladder.

STANDARD OF PERFORMANCE OF TASK

The ladder will be carried in an appropriate and safe manner as outlined on the attached checklist. The position of the ladder from base of structure must be about 1/4 of the working height of the ladder; there can be no wobble when the ladder is climbed.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Stepladder
Extension ladder
Single ladder

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when carrying and placing a ladder.
2. Identify situations that require ladder work.
3. List types of ladders and describe their application.
4. Note accessories available for ladder work.
5. Outline work sequences related to ladder work.
6. Explain workmanship standards.
7. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc. Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction.**

TEACHING ACTIVITIES

1. Acquire information and illustrations from newspaper advertising and local supply sources, in addition to book references--use originals or make copies to be used in learning activities.
2. Prepare a poster board display of acquired materials pointing out the types, sizes, and cost ranges of a variety of ladders; also, note and discuss safety features.
3. Obtain an extension ladder and demonstrate the proper method of carrying the ladder, locking the units in place, positioning the unit against a wall, and securing it.
4. Present a review and summation of events using the blackboard.
5. Assign student to carry and place a ladder.

PERFORMANCE OBJECTIVE 5

CRITERION-REFERENCED MEASURE

Questions

1. Name three types of ladders.
2. Give two safety precautions to follow when using a step ladder.
3.
 - a. When carrying a ladder, place both hands on beams and carry it upright. True or False?
 - b. If surface on which step ladder rests is uneven, place ladder so at least three of the four bases are on level ground. True or False?
 - c. A ladder can still be used if only one rung is missing. True or False?

Answers

1. Step ladder, extension ladder, and single ladder
2. Never climb higher than the second rung down from the top of the ladder, and be sure ladder braces are locked in place. (Student may list other precautions covered in the lesson.)
3.
 - a. False
 - b. False
 - c. False

Practical Application

Have student carry and place a ladder.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 5 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 5

CARRY AND PLACE LADDER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Inspected ladder for defects.		
2. Placed ladder on flat surface.		
3. Stood facing tip of ladder.		
4. Bent at knees and grasped ladder by beam.		
5. Lifted ladder and placed arm through rungs, one short of center, and grasped forward rung.		
6. Let upper beam rest on shoulder.		
7. Carried ladder to desired place. CAUTION: Paid attention to both front and rear tips of ladder.		
8. Placed ladder at desired position on ground. CAUTION: Did not place ladder in front of doorway unless caution was taken. Did not raise ladder under electrical lines.		
9. Rested ladder on beam. CAUTION: Made sure ladder base rested on firm, level base.		
10. Lifted ladder to shoulder height.		
11. Walked under beam and hand over hand walked ladder up. Butted ladder.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 5

CARRY AND PLACE LADDER

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
12. Lowered ladder against building.		
13. Untied halyard. Raised fly to desired height and locked dogs. CAUTION: Never moved extension ladder beyond a safe lap of two sections. Where possible, tied tip of ladder off.		
14. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 6

TASK

Shampoo carpet using wet process.

STANDARD OF PERFORMANCE OF TASK

Carpet must not show soil and must have an even, overall color.

SOURCE OF STANDARD

Ohio Trade and Industrial Education Service. **Custodial Training**, pp. 99-102.

CONDITIONS FOR PERFORMANCE OF TASK

Soiled carpet
Shampoo machine
Cleaning solution
Wet/dry vacuum

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Wet shampoo a carpet, removing spots.
3. Avoid over-wetting carpet.
4. Be familiar with equipment necessary to do the job.
5. Clean and store equipment properly.
- *6. Post appropriate warning signs.
7. Recognize the importance of vacuuming the carpet thoroughly before shampooing.

*Walking off wet carpet onto a tile floor may cause unsafe conditions.

RESOURCE

Sach. **A Complete Guide to Building and Plant Maintenance**, 2d ed.

TEACHING ACTIVITIES

1. Practice measuring chemical to be used according to square footage to be cleaned.
2. On the board list chemicals that should not be used, according to resource materials.
3. Study types of fabrics from which rugs are made.
4. Discuss precautions to be used when cleaning a wool rug or carpet. Discuss alternative methods of cleaning wool carpets, rather than using water based chemicals.

PERFORMANCE OBJECTIVE 6

TEACHING ACTIVITIES continued

5. Consult a professional carpet cleaner for recommendations on cleaning different types of rugs, i.e., rugs made of synthetic or natural fibers.
6. Become familiar with equipment to be used.

CRITERION-REFERENCED MEASURE

Questions

1. Before wet shampooing a carpet you should
 - a. remove all furniture from the room.
 - b. choose a chemical that is not alkaline by nature.
 - c. work quickly so as not to over wet the carpet.
 - d. all of the above
2. After shampooing the carpet you should
 - a. scrub the carpet with a brush.
 - b. dry the carpet with towels.
 - c. pick up the lather with a vacuum promptly.
3. After shampooing a carpet with the "wet" method, you should allow the carpet to dry _____ before vacuuming.
 - a. 3 to 5 hours
 - b. 6 to 8 hours
 - c. 8 to 10 hours and dry to the touch

Answers

1. d.
2. c.
3. c.

Practical Application

Have student wet shampoo carpet.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 6 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 6

SHAMPOO CARPET USING WET PROCESS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed furniture from area.		
2. Dry-vacuumed carpet thoroughly.		
3. Mixed cleaning solution and placed into tank of shampoo machine.		
4. Moved machine to farthest corner of room from entrance. Started machine and opened valve to let water flow through brush. Kept machine moving. Adjusted flow so that trace of suds appeared around edges of brush as machine moved over carpet.		
5. Moved machine in circular motion to ensure complete coverage of carpet.		
6. Had second person follow shampooer immediately with wet/dry vacuum to extract liquid.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 7

TASK

Vacuum carpet.

STANDARD OF PERFORMANCE OF TASK

Floor must be clean-looking to the edge with a uniformity of coloration; when struck sharply with object, no dust should rise from it.

SOURCE OF STANDARD

Ohio Trade and Industrial Education Service. *Custodial Training*, p. 100.

CONDITIONS FOR PERFORMANCE OF TASK

Dusty carpet
Vacuum cleaner

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Assemble and disassemble vacuum cleaner.
3. Become familiar with roller brush, belt, vacuum bag, and height adjuster for pile of carpet.
4. Evaluate condition of belt and roller brush. Clean brush if necessary.
5. Become familiar with any attachments.
6. Select attachment or tool to properly clean corners and edges of carpet (if wall to wall).

RESOURCE

Sach. *A Complete Guide to Building and Plant Maintenance*, 2d ed.

TEACHING ACTIVITIES

1. Demonstrate and discuss the uses of an upright vacuum as well as a tank type canister vacuum with wand and attachments.
2. Disassemble, clean, and assemble an upright vacuum and a canister type vacuum.
3. Become familiar with trouble signs with an upright vacuum: worn belt, worn roller brush, smoke, smell of hot rubber, hot wires, etc.
4. Select attachment or tool to properly clean corners and edges of carpet.
5. Demonstrate use of freon gas to freeze candle wax or harden gum, then chip and loosen with putty knife and vacuum carpet immediately. Read warning label. (See Performance Objective 11.)
6. Demonstrate efficiency of vacuum pickup of debris when bag is more than one-third full. Trace movement of debris from pickup to bag.

PERFORMANCE OBJECTIVE 7

TEACHING ACTIVITIES continued

7. Use one machine with wand attachment to clean the bag of another.
8. Pick up large pieces of debris and metal objects from floor before vacuuming. Emphasize that vacuum cleaner is not a trash compactor.

CRITERION-REFERENCED MEASURE

Questions

1. There is no need to vacuum a carpet after use if it looks clean. True or False?
2. An upright vacuum is the best tool to clean a carpet under desks and furniture and in corners of the room. True or False?
3. It is best to empty the vacuum bag after use even if not full. True or False?
4. If each person is required to empty or change the bag, clean the roller brush, etc., after use, it is not necessary to check the machine before use. True or False?
5. Freon gas is one of the safest chemicals on the market today. True or False?
6. If the vacuum cleaner throws a metal object to the side it is best to pick it up by hand. True or False?
7. If vacuum cleaner smells of hot wires or rubber or if it makes an odd sound, it is best to turn it off immediately. True or False?

Answers

1. False
2. False
3. True
4. False
5. False
6. True
7. True

Practical Application

Have student vacuum carpet.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 7 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 7

VACUUM CARPET

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Adjusted head of vacuum to desired height.		
2. Started vacuum and moved it across carpet. In heavily soiled areas such as walkways, pushed machine forward and pulled it back, making one pass. Made repeated passes, occasionally working across pattern where necessary.		
3. Where possible, moved furniture or vacuumed under it.		
4. In carpeted classrooms with aligned desks, cleaned corridor beside rows; moved chairs into cleaned row and cleaned chair aisle. Repeated.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 8

TASK

Sweep carpet by hand.

STANDARD OF PERFORMANCE OF TASK

Floor must be free from all litter; there can be no dust circulation.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Dust laden carpet
Corn broom
Push sweeper

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Improve the appearance of the carpet to the eye when use of a vacuum cleaner is not possible.
3. Select the opportune time to use a corn broom or a push sweeper.

RESOURCE

Teacher Information Sheet.

TEACHING ACTIVITIES

1. Identify and learn care of a corn broom and a push sweeper.
2. Identify optimum times of the day for use of corn broom or push sweeper rather than vacuum cleaner in a given area of a building.
3. Set up a daily schedule using a corn broom/push sweeper and a vacuum cleaner for regular carpet care where carpet is used by the general public--malls, airports, offices, classrooms, hospitals, etc.
4. Given dust build-up in corners and edges of a room, help students identify best tool to use if a vacuum cleaner with wand attachment is not available.

PERFORMANCE OBJECTIVE 8

CRITERION-REFERENCED MEASURE

Questions

1. Select the best tool for cleaning a carpet mat in a public building from 9:00 a.m. to 5:00 p.m. when the building is open to the general public.
 - a. Vacuum cleaner
 - b. Short handle bristle brush
 - c. Corn broom
 - d. Dust mop
 - e. All of the above
2. Select the best tool for cleaning carpet in a restaurant from 11:00 a.m. to 2:00 p.m.
 - a. Corn broom
 - b. Push broom
 - c. Vacuum cleaner
 - d. Push sweeper
 - e. Any of the above
3. It is not necessary to empty the debris collector in a push sweeper frequently because it will fill up and have to be done again. True or False?
4. Select the best tool for cleaning carpet after a building has closed for the day.
 - a. Corn broom
 - b. Vacuum cleaner
 - c. Push sweeper
 - d. Electric blower

Answers

1. c.
2. d.
3. False
4. b.

Practical Application

Have student sweep carpet by hand.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 8 to determine if the assignment was completed for competency.

PERFORMANCE OBJECTIVE 8

TEACHER INFORMATION SHEET

Carpets may need to be cleaned in certain instances with a corn broom or push sweeper.

1. When noise from a vacuum cleaner would not be acceptable.
2. For a touchup cleaning of the surface of the carpet between vacuum cleanings.
3. Cleaning corners and edges of wall-to-wall carpet with a corn broom when a vacuum cleaner with wand attachment is not available. (Corn broom may be slightly dampened with fine mist of water from spray bottle to keep down dust.)

The student needs to be aware that this task should never be used in the place of vacuum cleaning. Dirt remains down in the fibers of the carpet and can only be removed by a vacuum cleaner. Soil left in the pile of the carpet causes breakdown of the fibers and premature soiling of the carpet. The carpet would need to be extracted or "steam" cleaned more often, which is an expensive procedure, if this procedure was used instead of regular vacuum cleaner use.

CHECKLIST FOR PERFORMANCE OBJECTIVE 8

SWEEP CARPET BY HAND

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Using a corn broom, swept corners and edges of carpeted room lightly and briskly, removing all traces of dust and debris build-up.		
2. Upon entering the room, started sweeping immediately to the right of the entrance door, continuing around edges and corners of the room to the right until reaching the left side of the entrance door.		
3. Using a push sweeper, cleaned all debris from the surface of carpet while carpet was being used by the public.		
4. Cleaned and stored tools correctly.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 9

TASK

Spot clean carpet.

STANDARD OF PERFORMANCE OF TASK

Carpet must be free from spots.

SOURCES OF STANDARD

West Virginia Writing Team
Ohio Trade and Industrial Education Service. **Custodial Training.**

CONDITIONS FOR PERFORMANCE OF TASK

Carpet, soiled in spots
Spotting chart
Carpet cleaning solution
Absorbent material
Water
Ammonia

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Remove a spot from carpet without leaving an obvious lighter-colored, cleaner spot on the carpet.
3. Choose the correct chemical or dry powder to remove the spot.

RESOURCE

Sach. **A Complete Guide to Building and Plant Maintenance**, 2d ed., pp. 88-90.

TEACHING ACTIVITIES

1. Acquire two identical sample pieces of carpet. Place an ink stain, coffee stain, crayola stain, and lipstick stain on both pieces of carpet. Select the correct material and procedure to clean the spots. Clean one sample immediately after staining. Clean the other sample after seven days of traffic. Compare the ease of removal of the spots.
2. Learn the five steps of general cleaning procedures as listed in the resource material. Have student demonstrate the procedure.
3. Ask student to make a chart for removal of spots and stains from carpet. Resource people in the community such as commercial rug and carpet cleaners may be a helpful source of information.

PERFORMANCE OBJECTIVE 9

CRITERION-REFERENCED MEASURE

Questions

1. All ink stains may be removed from carpet if done immediately after the stain was noticed. True or False?
2. Greasy stains or oil based substances are best removed from carpet by first removing excess material from the carpet, then applying a dry cleaning fluid. True or False?
3. The general procedure for all spot removal is to remove the excess material first. True or False?
4. Cigarette burns on carpet can be removed with a vinegar and water solution. True or False?
5. A spot should be removed by wiping gently with a clean cloth from the edge of the soiled area toward the center, blotting with a clean dry cloth at intervals. True or False?

Answers

1. False
2. True
3. True
4. False
5. True

Practical Application

Have student spot clean carpet.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 9 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 9

SPOT CLEAN CARPET

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Determined cause of spot where possible.		
2. Checked a spotting chart for method and material to use in removing spot.		
3. Moistened area of spot with Ph neutral detergent solution or carpet cleaning solution if cause could not be determined.		
4. Blotted or stroked spotted area from outside of spot toward center.		
5. Used solution of household ammonia in water and treated as in Item 4 if detergent did not work satisfactorily, or used white vinegar and water or small amount of dry cleaning solvent and blotted as in Item 4. CAUTION: Did not use gasoline or lighter fluid or denatured alcohol.		
6. Applied white absorbent material--facial tissue, toilet tissue, paper towels, or clean cloth, after spot was removed.		
7. Kept absorbent material weighted down or flat on surface until dry.		
8. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 10

TASK

Remove heavy soil from carpet.

STANDARD OF PERFORMANCE OF TASK

Cleaned area must not show soil; cleaned area must blend well with rest of carpet; nap must be raised to match rest of carpet.

SOURCE OF STANDARD

Ohio Trade and Industrial Education Service. *Custodial Training*, pp. 99-103.

CONDITIONS FOR PERFORMANCE OF TASK

Heavily soiled carpet
Heavy duty vacuum
Carpet mop/damp cloth/dampened sponge
Cleaning solution

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Recognize the condition of a carpet that needs to be cleaned.
3. Clean a carpet with hand tools and cleaning solution or powder.
4. Recognize a carpet condition that calls for professional carpet cleaning beyond a carpet mop, brush, or vacuum cleaner.

RESOURCES

1. Oravetz. *Building Maintenance*, p. 338.
2. Sach. *A Complete Guide to Building and Plant Maintenance*, 2d ed., pp. 84-95.

TEACHING ACTIVITIES

1. Assemble and become familiar with the following carpet cleaning tools: carpet mops, sponges, brushes, and brush attachments.
2. Prepare a carpet for cleaning:
 - a. Remove furniture.
 - b. Treat or clean obvious spots. (See Performance Objective 9.)
3. Clean a carpet with powder cleaner. Follow directions on the label.
4. Clean a carpet with cleaning fluid.
5. Clean a carpet with solution of detergent or shampoo.

PERFORMANCE OBJECTIVE 10

CRITERION-REFERENCED MEASURE

Questions

1. When cleaning a carpet, the first thing to do is apply the cleaning powder or solution. True or False?
2. An advantage to cleaning carpet with powder or cleaning fluid is that carpet can be used again in a short time. True or False?
3. When wet cleaning carpet, only neutral detergents or shampoos should be used. True or False?
4. The final task when cleaning carpet is to vacuum the carpet when dry to raise the nap. True or False?

Answers

1. False
2. True
3. True
4. True

Practical Application

Have student remove heavy soil from carpet.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 10 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 10**REMOVE HEAVY SOIL FROM CARPET****Student's Name** _____**Date** _____**DIRECTIONS TO STUDENT**

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed furniture from heavily soiled area.		
2. Cleaned the heavily soiled area thoroughly using a heavy duty vacuum.		
3. Damp mopped carpet with carpet mop and commercially prepared mopping solution if soil remained.		
4. Scrubbed areas by hand with carpet mop, damp cloth, or dampened sponge (in solution).		
5. Feather cleaned areas to blend with rest of carpet.		
6. When dry, raked carpet or vacuumed carpet.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____**Date** _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 11

TASK

Remove gum or candle wax from carpet.

STANDARD OF PERFORMANCE OF TASK

Carpet must be free from gum or candle wax.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Carpet with gum wads
Dry ice
Solvent
Putty knife

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Recognize when the condition of a carpet requires gum or wax removal.

RESOURCE

Teacher Information Sheet.

TEACHING ACTIVITIES

1. Observe carpet which has gum or wax embedded in the fibers.
2. Ask student to make a chart listing chemicals that may be used in this lesson and the precaution for use of each chemical.
3. Demonstrate the removal of gum on a sample of carpet using one of the chemicals suggested above.

PERFORMANCE OBJECTIVE 11

CRITERION-REFERENCED MEASURE

Questions

1. Gum can easily be removed from carpet with a putty knife. True or False?
2. Any chemical used to freeze gum or wax will also freeze flesh or eyes. True or False?
3. It is best to wait until gum or wax has remained on the carpet for several days before removed. True or False?
4. Application of a chemical to gum or wax to make it brittle helps to remove it from the carpet. True or False?

Answers

1. False
2. True
3. False
4. True

Practical Application

Have student remove gum from carpet.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 11 to determine if the assignment was completed for competency.

PERFORMANCE OBJECTIVE 11

TEACHER INFORMATION SHEET

The regular cleaning of a carpet not only includes removal of spots and a thorough vacuuming, but also removal of gum or wax which may be embedded in the fibers.

An efficient method of removal is to harden the gum or wax by freezing. The substance can then be chipped into small pieces with a putty knife and removed immediately with a vacuum cleaner.

Cooling gas in the form of an aerosol spray is available at many janitorial supply stores. Directions for use on the label should be followed for optimum results. The gas freezes the substance to be removed when applied as directed. Care should be taken to keep the gas from the face as eye injury could result. Safety glasses should be worn while performing this task.

Ice or a solvent may also be used to harden or soften gum or wax for removal. Both of these chemicals should be used with extreme care to avoid injury.

CHECKLIST FOR PERFORMANCE OBJECTIVE 11
REMOVE GUM OR CANDLE WAX FROM CARPET

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Froze gum or candle wax deposit with a cooling gas or dry ice.		
2. Chipped gum or candle wax with putty knife or like instrument.		
3. Used hand-held spray bottle containing solvent to wet carpet around gum, or candle wax if freezing was not possible.		
4. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 12

TASK

Shampoo carpet using dry process (self-contained carpet extraction).

STANDARD OF PERFORMANCE OF TASK

Carpet must have an overall clean appearance; when a dry, clean, light-colored cloth is rubbed briskly on carpet, it should not show wet streaks or soil.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Soiled carpet
Heavy-duty vacuum
Buff/scrub machine
Dry cleaning compound
Brush/yarn pad

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Take the necessary steps to prepare a carpet for dry shampooing.
3. Become familiar with equipment to dry shampoo carpet.
4. Dry shampoo carpet according to standard of performance of task.

RESOURCE

Teacher Information Sheet.

TEACHING ACTIVITIES

1. Display either a powder cleaner or "liquid dry cleaner" or both with equipment to complete the dry cleaning of a carpet. Ask student to list, on a poster, steps for cleaning carpet. Attach the poster to the display.
2. Prepare a carpeted room for cleaning. Remove furniture carefully, and vacuum carpet thoroughly. Remove spots and/or gum from carpet.
3. Clean a carpet using both methods if possible: one half with powder, one half with a "liquid dry cleaner." Compare results:
 1. Appearance of carpet.
 2. Sweepings in the bag/soil in the water after rinsing pad.
 3. Decide if either method removed more soil than the other.

PERFORMANCE OBJECTIVE 12

CRITERION-REFERENCED MEASURE

Questions

1. The advantage of the dry cleaning method of cleaning over the wet shampoo method is
 - a. carpet can be used again in a shorter period of time.
 - b. there is less furniture to move.
 - c. carpet stays cleaner longer.
2. The "liquid dry cleaning" method requires that you have the following equipment on hand:
 - a. mop bucket wringer.
 - b. yarn pad.
 - c. floor machine and pad holder.
 - d. spray tank.
 - e. all of the above
3. Powder cleaners are usually brushed in the fibers of the rug, then left to "set" a few minutes before vacuuming. True or False?

Answers

1. a.
2. e.
3. True

Practical Application

Have student dry shampoo carpets.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 12 to determine if the assignment was completed for competency.

PERFORMANCE OBJECTIVE 12

TEACHER INFORMATION SHEET

Many powder cleaners which can be used for lightly soiled carpet are offered on the market. Care should be taken to follow directions for optimum results and prevention of equipment damage.

Some powders become damp when exposed to air; therefore, it is necessary to use a disposable paper liner to vacuum the powdered cleaner after it has "set" the required length of time.

Some companies offer a product called "liquid dry cleaner" which is mixed with water then sprayed lightly over the soiled carpet. After a few minutes of "set" time, a floor buffing machine with a special pad holder and damp yarn pad is used in a circular motion over the carpet. The pad takes up the dirt, is rinsed in a mop bucket of clear water (the excess water squeezed out in the wringer), and then placed under the floor machine again for removal of soil from the carpet. The carpet dries in about one hour and then is vacuumed to raise the nap.

The advantage of cleaning with either of these methods is that downtime is kept to a minimum. Normal traffic can be maintained through most of the cleaning, although shoe soles do become damp. Warnings of wet floors should be placed at strategic places.

CHECKLIST FOR PERFORMANCE OBJECTIVE 12

SHAMPOO CARPET USING DRY PROCESS (SELF-CONTAINED CARPET EXTRACTION)

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed furniture.		
2. Vacuumed carpet thoroughly.		
3. Sprinkled dry cleaning compound or sprayed liquid dry cleaner evenly over carpet.		
4. Used a brush pad or yarn pad on buff/scrub machine; scrubbed carpet in one direction then in another direction.		
5. Allowed carpet to "set" according to directions on dry cleaning compound.		
6. Vacuumed carpet thoroughly, using a heavy-duty vacuum.		
7. Raked or vacuumed carpet nap.		
8. Performed all work in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 13

TASK

Clean terrazzo floors.

STANDARD OF PERFORMANCE OF TASK

Floor must have overall clean, glossy finish with no obvious division marks.

SOURCE OF STANDARD

Brainard. *Handbook for School Custodians*, pp. 115-16.

CONDITIONS FOR PERFORMANCE OF TASK

Soiled terrazzo floor
Floor scrubber
Putty knife
Wet mop
Neutral cleaner
Mop bucket and wringer
Freon spray

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Understand the inherent properties of terrazzo.
3. Compare the care of terrazzo to other flooring materials.

RESOURCE

Sach. *A Complete Guide to Building and Plant Maintenance*, 2d ed., pp. 133-38.

TEACHING ACTIVITIES

1. Ask student to write a paper on the care of terrazzo using the resource book.
2. Examine a terrazzo floor, recalling the properties of terrazzo.
3. Compare the care of terrazzo with that of resilient tile floors. Make a chart of labor costs for the care of both types of floors.
4. List the materials necessary to maintain terrazzo floors.
5. Determine if a penetrating seal was used on the terrazzo floor to be scrubbed.

PERFORMANCE OBJECTIVE 13

CRITERION-REFERENCED MEASURE

Questions

1. Terrazzo floors need only a penetrating seal for protection, and the seal is absorbed into the portland cement. True or False?
2. Shoe leather is one of the finest polishers or abrasives you can use on terrazzo. True or False?
3. Since the surface of terrazzo is at least 70% marble, you should protect it with two coats of wax. True or False?
4. Surface coatings on terrazzo hold dirt and add to cleaning problems. True or False?
5. Terrazzo should be mopped with a neutral cleaner. True or False?

Answers

1. True
2. True
3. False
4. True
5. True

Practical Application

Have student scrub terrazzo floors.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 13 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 13**CLEAN TERRAZZO FLOORS****Student's Name** _____**Date** _____**DIRECTIONS TO STUDENT**

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Checked floor and removed gum and other debris. Dust mopped floor.		
2. Assembled tools, materials, and equipment.		
3. Wet mopped a neutral cleaning solution on the floor; allowed several minutes for the grime dissolving action to take place.		
4. Scrubbed with electric floor scrubber.		
5. Mopped up the dirt laden solution.		
6. Rinsed the floor; changed water frequently.		
7. Cleaned and stored equipment properly.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____**Date** _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 14

TASK

Vacuum floor surfaces.

STANDARD OF PERFORMANCE OF TASK

Floor surface must be free from dust and dirt so that when wiped with a clean cloth it does not show smudge.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Floor surface in need of vacuuming
Vacuum cleaner

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Evaluate the condition of the vacuum cleaner, making corrections as needed.
3. Demonstrate the ability to vacuum a room, leaving the floor free from dust and dirt.

RESOURCE

Sach. **A Complete Guide to Building and Plant Maintenance**, 2d ed., pp. 90-95.

TEACHING ACTIVITIES

1. Invite a vacuum cleaner retailer who also services vacuums to speak to the class concerning types of vacuum cleaners on the market and the care they should receive.
2. Have each student disassemble, inspect, and reassemble a vacuum cleaner: upright and canister.
3. Inspect corners and edges of carpeted rooms and under furniture for dust and dirt. Discuss which tool to use in cleaning these places.
4. Demonstrate how to vacuum a room in a pattern so that the entire surface is cleaned.

PERFORMANCE OBJECTIVE 14

CRITERION-REFERENCED MEASURE

Questions

1. If the dust bag on a vacuum cleaner is emptied, the vacuum is ready to use. True or False?
2. A good vacuum cleaner can go for several days without the worker emptying the bag. True or False?
3. The roller brush should be inspected for strings, etc., that may be wound around it. True or False?
4. The belt on the machine should be inspected for overstretching, cuts, etc., and perhaps be replaced. True or False?
5. Paper clips, nails, pencils, large pieces of paper, etc., should be picked up before vacuuming. True or False?

Answers

1. False
2. False
3. True
4. True
5. True

Practical Application

Have student vacuum floor surfaces.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 14 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 14

VACUUM FLOOR SURFACES

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Cleaned corners, edges, and under low furniture with corn broom or wand attachment first.		
2. Started vacuum at entrance to area and cleaned along nearest wall.		
3. Cleaned floor in sections by thrusting cleaner up and back one even strip.		
4. Stood to side of cleaned section and moved vacuum across first strips, repeating action in Item 2.		
5. Cleaned and stored equipment properly.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 15

TASK

Sweep uncarpeted floors.

STANDARD OF PERFORMANCE OF TASK

Floor must have clean, dirt-free surface; there can be no dust in air and none settled on wall and furniture.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Soiled, uncarpeted floor
Corn broom
Dust pan
Putty knife
Dry ice/freon
Treated swivel dust mop

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Prepare an uncarpeted floor for sweeping (dust mopping).
3. Sweep an uncarpeted floor so that no grit can be found by fingertips on the floor.

RESOURCE

Teacher Information Sheet.

TEACHING ACTIVITIES

1. Prepare soiled dust mops for use:
 - a. launder in mesh bag
 - b. treat with dust mop treatment (rule of 6 - one ounce of treatment for every six inches of dust mop)
 - c. place in plastic bag overnight
2. Select cafeteria floor or hall for sweeping. Use putty knife for wads that will not come up with dust mop. Black marks may be removed using rubber shoe sole on foot as an eraser. Start first lane next to wall overlapping lanes. Sweep out corners and door jams with corn broom. Take up and dispose of sweepings.

PERFORMANCE OBJECTIVE 15

TEACHING ACTIVITIES continued

3. Display a rigid dust mop and swivel dust mop. Display various dust mop heads. Discuss the Saran yarn dust wick that needs no treatment. Compare floors that have been swept with a corn broom to floors that have been dust mopped. Give both floors the fingertips test.

CRITERION-REFERENCED MEASURE

Questions

1. Which of the following equipment is needed to dust mop a floor?
 - a. Corn broom
 - b. Dust pan
 - c. Container for sweepings
 - d. Treated dust mop
 - e. Putty knife
 - f. All of the above
2. A twenty-four inch dust mop requires four ounces of dust mop treatment. True or False?
3. It is best to use a putty knife when dust mopping to remove substances that cannot be removed by a dust mop. True or False?

Answers

1. f.
2. True
3. True

Practical Application

Have student sweep uncarpeted floors.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 15 to determine if the assignment was completed for competency.

PERFORMANCE OBJECTIVE 15

TEACHER INFORMATION SHEET

An efficient way to sweep a floor is to use a clean, treated, 24 inch, swivel dust mop. For an unobstructed area it is more efficient to use a 36" dust mop, and the mop should be held at a 45° angle. A fingertips test on the floor before and after sweeping will convince the student of the effectiveness of using a dust mop rather than a corn broom. The frequent use of a dust mop removes grit tracked onto the floor. The abrasion that occurs between the shoe soles, grit, and the floor tends to destroy the protective wax coating on the floor prematurely on unswept or broom swept floors. Brushes or brooms tend to leave tracks of grit behind that wear the wax away.

A properly treated dust mop attracts and holds dust, dirt, and grit until moved to a central take-up area. The dust mop should always be used in conjunction with a putty knife to remove wads of gum, etc., from the floor.

CHECKLIST FOR PERFORMANCE OBJECTIVE 15
SWEEP UNCARPETED FLOORS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Gathered tools and cleaned gum and debris from floor.		
2. Started first lane next to the wall.		
3. Overlapped strokes, taking care not to leave ridges of dust and debris.		
4. Removed dust and dirt piled at end of rows with corn broom and dust pan.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 16

TASK

Strip floor wax using scrubbing machine.

STANDARD OF PERFORMANCE OF TASK

Floor must have an even "bleached" look. There can be no old wax spots, mop streaks, or scrub whorls.

SOURCES OF STANDARD

West Virginia Writing Team
Ohio Trade and Industrial Education Service. *Custodial Training*, p. 67.

CONDITIONS FOR PERFORMANCE OF TASK

Waxed floor to be stripped	Cleaning solution
Buffer	Clear vinegar water solution
Scrub pad (hand)	Black strip pad
Wet/dry vacuum	Swivel scrub pad with handle

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Recognize the need to strip a floor rather than scrub or mop.
3. Use the floor buffer and stripping pad successfully in removing old floor finish.
4. Clean corners and edges using hand tools.

RESOURCES

1. Sach. *A Complete Guide to Building and Plant Maintenance*, 2d ed., pp. 167-73.
2. Teacher Information Sheet.

TEACHING ACTIVITIES

1. Assign student to help assemble a display of equipment and chemicals necessary for the performance of the task.
2. Review Performance Objective 15. Instruct student to dust mop the floor to be stripped.
3. Assemble a panel of experts on subjects of stripping and waxing floors. Have student ask questions of the panel from a prepared list.
4. Assign student to interview experts to find out why and how often this expensive operation needs to be performed. Ask them what can be done in preventive maintenance to delay having to strip a floor.
5. Lecture on importance of stripping floor at corners, edges, and door jams prior to stripping middle of floor. Students should use putty knife, abrasive pad on a swivel handle with pad holder, and abrasive hand pad.

PERFORMANCE OBJECTIVE 16

CRITERION-REFERENCED MEASURE

Questions

1. A floor should be stripped down to the tile every 30 days. True or False?
2. The worker may use the same mop in all three operations: put down solution, first rinse, and second rinse. True or False?
3. Care should be taken when stripping solution is left on tile because solution might damage tile. True or False?
4. The first rinse must be done immediately after the solution has been taken up--before the floor dries. True or False?

Answers

1. False
2. False
3. True
4. True

Practical Application

Have student strip floor wax using scrubbing machine.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 16 to determine if the assignment was completed for competency.

PERFORMANCE OBJECTIVE 16

TEACHER INFORMATION SHEET

The student may refer to Section 10D: Floor Scrubbing from **A Complete Guide to Building and Floor Maintenance** for most of the directions to complete the task of floor stripping. Following are a few additions or changes suggested for the success of this endeavor.

1. Use a black stripping pad and pad holder on the buffer instead of a brush; however, several stripping brushes are available on the market today.
2. Use a three compartment tank--one for the stripping solution and two for clear water (first and second rinse), or use three mop buckets and two wringers.
3. Use a stripper in solution according to directions.
4. Dust mop floor after using putty knife and before putting the solution on the floor.
5. Floor must be rinsed at least twice using clean, labeled mops: first rinse mop and second rinse mop.
6. First rinse must be mopped up immediately to prevent drying the floor.

CHECKLIST FOR PERFORMANCE OBJECTIVE 16
STRIP FLOOR WAX USING SCRUBBING MACHINE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Checked machine cord for breaks.		
2. Used scrub pad on machine for "dry run" around fixed furniture and baseboards.		
3. Mixed solution according to directions on stripper. Spread and let work according to directions.		
4. Started scrubbing action by moving machine slowly from left to right and back again, taking care to apply adequate scrub time to each area.		
5. Cleaned scrub water from first area and checked to see if wax was coming up.		
6. Vacuumed dirty water and mopped immediately with no rinse stripper.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 17

TASK

Scrub floors by using buffer.

STANDARD OF PERFORMANCE OF TASK

Floor must have even, clean appearance with no "dirty water" streaks and no unscrubbed spots.

SOURCES OF STANDARD

Brainard. *Handbook for School Custodians*, p. 103.
Ohio Trade and Industrial Education Service. *Custodial Training*, pp. 67-69.

CONDITIONS FOR PERFORMANCE OF TASK

Floor space to be scrubbed
Buffer
Scrub brush (hand)
Scrub pad
Clean water

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Assemble necessary equipment and tools for the task.
3. Recognize importance of cleaning build-up of dirt on floor at corners, edges, and door jambs.
4. Recognize the need for scrubbing the floor rather than mopping or stripping.

RESOURCE

Sach. *A Complete Guide to Building and Plant Maintenance*, 2d ed., pp. 140, 167-76.

TEACHING ACTIVITIES

1. Display equipment and materials for the task. Assign student to make a list of the necessary steps for scrubbing a floor on poster board. Attach to display.
2. Lecture on need for scrubbing when mopping cannot clean lightly embedded soil. Observe a floor needing scrubbing and show that mopping will not clean the floor.
3. Lecture on chemical proportions to water used for scrubbing. Emphasize the need to use cool water to keep from removing wax or floor finish unnecessarily. Ceramic tile or concrete may be scrubbed with hot water.

PERFORMANCE OBJECTIVE 17

CRITERION-REFERENCED MEASURE

Questions

1. A piece of equipment that will not be needed to scrub floors is a
 - a. buffer.
 - b. wet mop.
 - c. stripper.
 - d. mop bucket with a wringer.
2. It is important to rinse the floor immediately after scrubbing
 - a. to keep the scrub solution from drying on the floor.
 - b. to take up the wax.
 - c. to keep the floor wet as long as possible.
3. The reason for scrubbing a floor is to take off the old wax or finish. True or False?

Answers

1. c.
2. a.
3. False

Practical Application

Have student scrub floors by using buffer.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 17 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 17

SCRUB FLOORS BY USING BUFFER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Gathered tools and equipment.		
2. Checked cord for cuts or breaks.		
3. Laid down solution; let stand.		
4. Hand scrubbed area in corners and along cove molding.		
5. Used back and forth motion with pad or brush resting flat on floor.		
6. Removed scrub solution immediately after moving from scrubbed area.		
7. Rinsed scrubbed area thoroughly with clean, cool water.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 18

TASK

Polish high-gloss floor surfaces.

STANDARD OF PERFORMANCE OF TASK

Floor must have even, glossy appearance with no streaks, buff marks, or dust on surface.

SOURCE OF STANDARD

Higgins. *Spray Systems: Ready Aid for Cleaning Demands.*

CONDITIONS FOR PERFORMANCE OF TASK

Buffed floor surface with wax or floor finish coating still showing

Mop

Buffer

Yarn (or fine buffing pads)

Spray bottle

Wax/floor finish

High speed buffer and pads

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Polish a floor that shows a dullness of wax or floor finish.
3. Recognize a floor that needs to be scrubbed or stripped, and then waxed or coated with floor finish, as opposed to a floor that needs to be buffed or polished.

RESOURCE

Teacher Information Sheet.

TEACHING ACTIVITIES

1. List on the board the necessary equipment and materials to polish a floor coated with liquid-water emulsion wax. Question student as to the difference between a buffable wax and a hard gloss floor finish.
2. List on the board the necessary equipment and materials to polish a floor coated with a water emulsion resin. Include a regular buffer and a high speed buffer.
3. Practice using both buffers until student has mastered each one.
4. Ask student to research the most popular kinds of floor coatings today for resilient tile floors.

PERFORMANCE OBJECTIVE 18

TEACHING ACTIVITIES continued

5. Ask student to research the most popular kinds of spray or mop-on buffing chemicals available today. Question student as to which would be easier to use and take fewer man-hours.

CRITERION-REFERENCED MEASURE

Questions

1. The same product can always be used with a high speed buffer as with a low speed buffer. True or False?
2. There are mop-on products that can be used with a high speed buffer. True or False?
3. Floor wax and floor finish are two expressions meaning the same thing. True or False?
4. A wax is movable on the floor while a finish is a hard tough coating. True or False?
5. A person can restore a floor by buffing if there is no wax or finish on the floor as a base coat. True or False?

Answers

1. False
2. True
3. False
4. True
5. False

Practical Application

Have student polish high-gloss floor surfaces.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 18 to determine if the assignment was completed for competency.

PERFORMANCE OBJECTIVE 18

TEACHER INFORMATION SHEET

There are many products on the market today which are manufactured for protection of resilient floors. The water emulsion resins and metal interlock polymers produce a hard, tough coating with a high luster. Usually, the manufacturer offers companion products to use with both low speed and high speed buffers (more than 1800 rpm). These products are more popular than the true waxes which contain a percentage of carnauba wax.

True waxes move on the floor and can be buffed to a high luster without a spray-buff or mop-on product. In heavy traffic and under heavy use the true waxes tend to absorb and hold dirt and stain, and they are difficult to mop clean. However, they are excellent on wood floors.

The student should be cautioned never to start a buffing operation without first cleaning the floor with a mopping solution and letting it dry. Also, the chemical used in the buffing should be known to react well to the coating that is presently on the floor.

Regular buffing can prolong the luster of the floor and enhance its eye appeal, delaying the need to strip, scrub and refinish, or rewax the floor.

CHECKLIST FOR PERFORMANCE OBJECTIVE 18**POLISH HIGH-GLOSS FLOOR SURFACES****Student's Name** _____**Date** _____**DIRECTIONS TO STUDENT**

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Collected tools.		
2. Dust mopped floor.		
3. Damp mopped floor, allowed to dry, and applied spray-on or mop-on product.		
4. Buffed floor with fine buffing pad or yarn pad.		
5. Dust mopped floor with clean dry mop that had been laundered at least once.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____**Date** _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 19

TASK

Damp mop uncarpeted floors.

STANDARD OF PERFORMANCE OF TASK

Floor must be clean of mop streaks and mop strings.

SOURCE OF STANDARD

Brainard. *Handbook for School Custodians*, pp. 120-25.

CONDITIONS FOR PERFORMANCE OF TASK

Lightly soiled uncarpeted floor

Mop

Cleaning solution

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Recognize the condition of a floor that needs to be damp mopped.
3. Assemble equipment and materials necessary to damp mop a room.
4. Damp mop an uncarpeted room according to standard of performance of task.

RESOURCE

Sach. *A Complete Guide to Building and Plant Maintenance*, 2d ed., pp. 142-43.

TEACHING ACTIVITIES

1. Discuss importance of starting the task with a clean mop head and washing mop head thoroughly after use until the water runs clear.
2. Discuss importance of changing to clean water in the mop bucket frequently during the mopping process.
3. Have student practice mopping from side to side making a figure 8, horizontally, turning the mop over to the clean side after a few strokes, and then rinsing and squeezing out the excess water while wringing as dry as possible. Emphasize that too much water left on the floor will leave spots on the floor coating. These spots are difficult to remove.

PERFORMANCE OBJECTIVE 19

CRITERION-REFERENCED MEASURE

Questions

1. It is impossible to keep a damp mop clean. True or False?
2. Mopping equipment should be kept ahead of the work in the area next to be mopped. True or False?
3. The mop should first be drawn parallel to the baseboard and furnishings to avoid splashing them. True or False?
4. Warning signs need not be used because there is usually a "wet floor" sign on the mop bucket. True or False?

Answers

1. False
2. True
3. True
4. False

Practical Application

Have student damp mop uncarpeted floors.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 19 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 19

DAMP MOP UNCARPETED FLOORS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Assembled tools, equipment, and supplies.		
2. Mixed mop solution.		
3. Placed wet mop in solution and squeezed mop as dry as possible.		
4. Placed mop parallel to wall with strands trailing behind and pushed mop along at wall. Used hands to get mop into corners.		
5. Rinsed mop, wrung out, and used figure 8 or side-to-side motion on rest of floor.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 20

TASK

Wet mop tile floors.

STANDARD OF PERFORMANCE OF TASK

Floor must contain no gum, heavy soil, or water marks on surface.

SOURCE OF STANDARD

Ohio Trade and Industrial Education Service. *Custodial Training*, pp. 112-26.

CONDITIONS FOR PERFORMANCE OF TASK

Soiled tile floor
Cleaning solution
Mop
Putty knife
Freon /dry ice

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Recognize the need for wet mopping tile floor as opposed to damp mopping.
3. Recognize the need to render the floor as clean as possible before wet mopping by removing gum wads, tar, etc., with a putty knife and dust mopping the floor

RESOURCE

Sach. *The Complete Book of Building and Plant Maintenance*, 2d ed., pp. 144-47.

TEACHING ACTIVITIES

1. Instruct student to discuss the importance of keeping mop and solution clean. (Refer to Performance Objective 19.)
2. Demonstrate the operation of wet mopping as opposed to damp mopping. Emphasize that both activities should be preceded by dust mopping thoroughly and removing of gum, tar, etc., from the floor. Emphasize that removing all solution from the floor, leaving only a damp floor, prevents water pooling into water spots as it dries.

PERFORMANCE OBJECTIVE 20

CRITERION-REFERENCED MEASURE

Questions

1. It is best to eliminate the dust mopping operation before mopping to save time. True or False?
2. If water spots appear after the floor has dried, too much water was left on the floor. True or False?
3. Wet mopping and damp mopping are expressions that have the same meaning. True or False?

Answers

1. False
2. True
3. False

Practical Application

Have student wet mop tile floors.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 20 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 20

WET MOP TILE FLOORS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Assembled tools and equipment.		
2. Mixed cleaning solution.		
3. Removed gum, grease marks, and heavy soil.		
4. Saturated mop in solution, started in upper left hand corner (from exit), and mopped, using scrubbing motion for stained area.		
5. Mopped one section and rinsed. Repeated until floor was clean. Left no excess water on floor.		
6. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 21

TASK

Apply floor wax/sealer.

STANDARD OF PERFORMANCE OF TASK

Floor must be covered evenly with no streaks visible; no foreign matter can be embedded in surface of wax; floor can show no bubbles, blank places, or lint and dust specks; surface must be clear with no discolorations.

SOURCES OF STANDARD

Ohio Trade and Industrial Education Service. *Custodial Training*, p. 134.
West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Stripped dry floor
Floor wax
Mop bucket with wringer
Floor sealer
Floor finish mop
Water

Floor buffer
Strip pad
Wax/sealer applicator
Push broom - 24 inch
Terry cloth towel

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Recognize when the floor is ready for wax or sealer.
3. Have skills necessary to perform the task.
4. Assemble the necessary equipment and materials to perform the task.

RESOURCE

Teacher Information Sheet.

TEACHING ACTIVITIES

1. Practice the skills of floor buffing and tack ragging.
2. Practice the skill of applying sealer or floor finish with an applicator.
3. Practice the skill of applying floor finish or wax with a clean, rinsed mop.
4. Assemble all equipment and materials for the task.
5. Ask a panel of students to discuss the steps in order, in applying sealer and floor wax or floor finish. Have another student write these on the board.

PERFORMANCE OBJECTIVE 21

CRITERION-REFERENCED MEASURE

Questions

1. The following item is not used in the tack ragging operation:
 - a. push broom
 - b. mop
 - c. terry cloth towel
 - d. container of clear rinse water
2. A thin coat of wax/finish is better than a thick coat. True or False?
3. The first coat of sealer and wax or finish used should be compatible with the second coat. True or False?
4. Floor wax, finish, or sealer should be applied as in wet mopping. True or False?

Answers

1. b.
2. True
3. True
4. False

Practical Application

Have student apply floor wax/sealer.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 21 to determine if the assignment was completed for competency.

PERFORMANCE OBJECTIVE 21

TEACHER INFORMATION SHEET

One of the most important tasks after a floor has been stripped or scrubbed, and rinsed and dried is to dry buff and tack rag the floor before applying sealer or finish. The entire floor area should be dry buffed with a black strip pad to loosen any residue from the stripped solution that may remain after rinsing.

Then a terry cloth towel is wrung damp dry in clear water, placed on the floor with a push broom on it, the towel ends lapped over the push broom. The floor is cleaned with the damp towel and push broom using a steady movement in straight overlapped lanes until all the floor has been cleaned. The towel should be rinsed free of debris from time to time as needed.

When floor has dried, a sealer or floor finish may be applied as a first coat using a clean, rinsed, damp mop or an applicator.

If an applicator is used, it is recommended that the sealer or finish be applied in a small square first in one direction, then "pulled out" in a crosswise direction while still wet. With a mop, care should always be taken to mop into a wet surface of finish or wax to eliminate lap marks. A large area such as a cafeteria should have two or three people mopping lanes in echelon so that each is mopping into wet wax/finish; otherwise, lap marks will show when the wax/finish has dried.

The wax or finish mop should be drawn parallel with the baseboard around the perimeter of the room to protect baseboards, then the wax/finish should be applied in the center of the room for the last coat.

If a sealer is used as a first coat, it should be compatible with the finish that is used as a second coat; otherwise, bonding will not occur and the finish will flake.

CHECKLIST FOR PERFORMANCE OBJECTIVE 21

APPLY FLOOR WAX/SEALER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
A. Applied sealer on a stripped dry floor.		
1. Collected tools and materials and put them at area to be sealed.		
2. Buffed and tack ragged floor.		
3. Started in upper left or right corner with back toward exit. Measured the distance which could be comfortably reached with applicator. Applied sealer and gently pulled applicator toward, but not touching, toes. Progressed left or right until covering distance which could be comfortably reached. Stood on side of covered square, crisscrossed stroke again; took care that sealer did not "tear" or pull away from floor surface. Continued this pattern until floor was covered.		
4. Performed all tasks in a safe manner.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 21

APPLY FLOOR WAX/SEALER

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
B. Applied wax on a sealed dry floor.		
1. Poured wax into clean mop bucket.		
2. Wet cleaned floor finish mop reserved for waxing and wrung out thoroughly.		
3. Ran damp mop around floor at baseboards to apply thin coat of wax around edges of room.		
4. Used damp mopping technique; covered rest of room with thin coat of wax.		
5. Allowed wax to dry for 30 minutes or more.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date: _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 22

TASK

Treat dust mops and dust cloths.

STANDARD OF PERFORMANCE OF TASK

Treated mop heads should meet the following specifications: when mop heads and rags are dropped from a height of 12 inches onto a clean piece of paper and picked up at once, there should be no "oily" or "wet" smudges; when wiped or pushed lightly over dry dusty areas, all dust must cling to cloths and rags.

SOURCES OF STANDARD

Brainard. *Handbook for School Custodians*.
West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Clean dust mop
Clean dust cloth
Dust mop treatment

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Treat clean dust mops and dust cloths for use the following day.
3. Be aware of leaving dangerous slick spots if dust mop is used prematurely.

RESOURCE

Teacher Information Sheet.

TEACHING ACTIVITIES

1. Wash and dry three or four dust mops of different lengths in a warm detergent solution.
2. Demonstrate treatment of 24-, 36-, and 48-inch dust mops using the rule of six inches per ounce of treatment.
3. Demonstrate sweeping with a treated dust mop and an untreated dust mop. Let student compare the quality of work done.

PERFORMANCE OBJECTIVE 22

CRITERION-REFERENCED MEASURE

Questions

1. Clean, treated dust mops are more effective at picking up dirt and dust than untreated dust mops. True or False?
2. Dust mop treatment should be used at the rate of six ounces per one inch of dust mop length. True or False?
3. Dangerous slick spots may occur if the dust mop is used immediately after treatment. True or False?

Answers

1. True
2. False
3. True

Practical Application

Have student treat dust mops and dust cloths.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 22 to determine if the assignment was completed for competency.

PERFORMANCE OBJECTIVE 22

TEACHER INFORMATION SHEET

There are several methods by which clean dust mops and dust cloths may be treated. The writer has found the easiest method is to use the "rule of six inches" for dust mops, pouring one ounce of treatment per six inches the length of the dust mop, rolling up the dust mop, and placing it with the others in a tightly closed plastic bag. The bags should be inside a covered metal can for fire protection.

Dust cloths may also be placed inside the plastic bag for treatment. All treated mops should be left overnight for even distribution into the wicks. Dust mops left exposed to the air tend to dry out and seem ineffective at picking up dust and dirt compared to those that have cured overnight in a plastic bag.

CHECKLIST FOR PERFORMANCE OBJECTIVE 22

TREAT DUST MOPS AND DUST CLOTHS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Secured cloths, containers for cloths, and mop heads that did not require treatment.		
2. Selected freshly laundered and thoroughly dry mop head and shook vigorously to remove lint.		
3. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 23

TASK

Replace floor tile.

STANDARD OF PERFORMANCE OF TASK

There must be no mastic "bleeding" through joints; new tile (except for faded color) must match old tile in thickness, width, length, and color.

SOURCE OF STANDARD

Brainard. *Handbook for School Custodians*, pp. 107-14.

CONDITIONS FOR PERFORMANCE OF TASK

Section of tile floor in need of replacing	Rolling pin
Vacuum	Utility knife
Mastic adhesive	New tile
Putty knife	Paintbrush
Scissors	Notched trowel

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Select proper tools for job.
3. Explain and demonstrate procedure for removing old or broken tile.
4. Discuss how to prepare floor and lay new tile.
5. Make special cuts using proper tools.

RESOURCES

1. Lane Publishing Co. *Remodeling With Tile*.
2. Gladstone. *The Simon and Schuster Complete Guide to Home Repair and Maintenance*.

TEACHING ACTIVITIES

1. Acquire information and procedures from local supply sources, in addition to book references; make copies for handouts to be used in learning activities.
2. Prepare an area in shop where tiles can be laid and floor can be prepared for laying new tile.
3. Demonstrate how to remove old or broken tile using proper tools.
4. Demonstrate the procedure for cleaning area where tiles are to be laid and how to apply adhesive evenly over area.

PERFORMANCE OBJECTIVE 23

TEACHING ACTIVITIES continued

5. Demonstrate how to lay new tile, applying proper pressure and allowing adhesive to hold firmly.
6. Review procedures and allow student to remove tile, spread adhesive, and lay tile.

CRITERION-REFERENCED MEASURE

Questions

1. Tile must be laid in place as soon as adhesive is placed on floor. True or False?
2. A chisel and a(n) _____ are the proper tools for removing old or chipped tile.
3. Adhesive only has to be placed in four corners of tile when applying to floor. True or False?

Answers

1. False
2. hammer
3. False

Practical Application

Have student replace floor tile.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 23 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 23

REPLACE FLOOR TILE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed loose, broken, or excessively worn tile.		
2. Removed old adhesive from base flooring.		
3. Vacuumed area to remove dust.		
4. Applied new mastic to floor. Covered entire area to be retiled.		
5. Let mastic remain on floor until tacky.		
6. Laid new tile in area; saw that it matched old tile (if patching) in dimensions (thickness, width, and length) and color of design chosen.		
7. Pressed tile lightly into place. Allowed time to dry.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 24

TASK

Wash walls.

STANDARD OF PERFORMANCE OF TASK

No streaks or smears from liquid use may be present; all walls must dry with same color appearance.

SOURCES OF STANDARD

West Virginia Writing Team
Brainard. *Handbook for School Custodians*, p. 145.

CONDITIONS FOR PERFORMANCE OF TASK

Room with soiled walls
Vacuum cleaner
Drying rag
Sponge
Cleaning solution
14-quart pail

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Demonstrate how to prepare for washing walls.
3. Make selection of cleaning solution for type wall.
4. Prepare cleaning solution with water.
5. Demonstrate procedure and begin washing wall both standing on floor and standing on ladder.
6. Demonstrate cleanup after washing is complete.

RESOURCE

Oravetz. *Building Maintenance*.

TEACHING ACTIVITIES

1. Prepare area in class or shop to be used in demonstration of washing walls.
2. Demonstrate how to prepare walls for washing.
3. Instruct student on materials and procedure for washing walls safely.
4. Demonstrate how to dust wall and prepare water with cleaning solution.
5. Demonstrate how to begin washing a section of wall and demonstrate the proper use of a sponge.
6. Review procedure with student and allow him/her to begin washing sections of wall.

PERFORMANCE OBJECTIVE 24

CRITERION-REFERENCED MEASURE

Questions

1. After washing a wall, rinsing or drying isn't necessary. True or False?
2. Before washing walls you must remove all loose _____ and _____ must be removed.
3. You must start washing walls at the bottom and work up. True or False?

Answers

1. False
2. dust, dirt
3. True

Practical Application

Have student wash walls.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 24 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 24

WASH WALLS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed everything attached to walls.		
2. Moved all furniture away from wall areas.		
3. Swept or vacuumed wall to remove all loose dirt and dust.		
4. Began washing from the bottom of wall; took small square areas one at a time.		
5. Rinsed the same area immediately following washing process.		
6. Dried with rag the same area, following rinsing.		
7. Repeated this process until all wall surfaces were completely finished.		
8. Performed all tasks in safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 25

TASK

Polish ornamental metals.

STANDARD OF PERFORMANCE OF TASK

Metal must have a clean shine; no marks or streaks from cleaning solution may be visible.

SOURCE OF STANDARD

Brainard. *Handbook for School Custodians*, p. 134.

CONDITIONS FOR PERFORMANCE OF TASK

Ornamental surface in need of cleaning/polishing
Cleaning solution
Metal polish
Rag
Sponge
Cloth/paper towel

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. List materials and solution needed for polishing ornamental metals.
3. Outline procedure for cleaning and polishing metals.
4. Explain importance of using proper cleaning and polishing solutions.

RESOURCE

Lander. *Home Repair and Maintenance*.

TEACHING ACTIVITIES

1. Acquire handouts from cleaning and polishing solution suppliers along with other material from library and compile handout to be used in teaching activity.
2. Acquire several pieces of metals to be used in demonstrating cleaning and polishing procedure.
3. Demonstrate to class procedure used to clean metals to be polished. Explain different types of metals and type of solution to use on each one.
4. Demonstrate method of polishing metals, covering area to be polished completely with metal polish; demonstrate removal method.
5. Review procedure and then allow student to clean and polish ornamental metals.

PERFORMANCE OBJECTIVE 25

CRITERION-REFERENCED MEASURE

Questions

1. Metals do not have to be clean before polishing. True or False?
2. To remove solution from metal use a(n) _____ or _____.
3. Metal polish is removed with a(n) _____ or _____.

Answers

1. False
2. rag, sponge
3. cloth, paper towel

Practical Application

Have student polish ornamental metals.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 25 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 25

POLISH ORNAMENTAL METALS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Analyzed the condition of each piece and area of metal to be cleaned.		
2. Removed all excess particles of dirt and dust.		
3. Applied cleaning solution evenly over entire area to be cleaned.		
4. Removed all solution from entire area with rag or sponge.		
5. Rinsed surface with a damp sponge.		
6. Dried completely with rag.		
7. Covered cleaned area completely with metal polish.		
8. Shined briskly with cloth or paper towel.		
9. Performed all work in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

PERFORMANCE OBJECTIVE 26

CRITERION-REFERENCED MEASURE

Questions

1. To remove any excess dust or dirt a(n) _____ is used.
2. You must prevent wood from being completely soaked. True or False?
3. A mild detergent and damp sponge are used when _____ and _____ are to be removed.

Answers

1. vacuum
2. True
3. stains, marks

Practical Application

Have student clean wood surfaces.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 26 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 26

CLEAN WOOD SURFACES

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed all objects from areas to be cleaned.		
2. Vacuumed to remove any excess dust or dirt.		
3. Wiped and shined surface with treated mop or dust cloth, if there were no marks or stains. <u>BUT</u> , if there were marks or stains, followed process below.		
4. Removed marks and stains with proper cleaner.		
5. Washed gently with mild detergent and damp sponged where necessary.		
6. Rinsed with damp cloth or sponge at once.		
7. Dried immediately with cloth. CAUTION: Guarded against soaking wood.		
8. Wiped and shined with treated mop or dust cloth when completely dry.		
9. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 27

TASK

Clean porcelain surfaces.

STANDARD OF PERFORMANCE OF TASK

Porcelain surfaces should have a glossy appearance with no stains, streaks, spots, or film.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Soiled porcelain surface
Stain and rust remover
Cleaning solution
Sponge
Rag

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. List materials and solutions needed for cleaning porcelain surfaces.
3. Outline the types of cleaning solutions and procedures for cleaning porcelain surfaces.
4. Explain workmanship standards.

RESOURCE

Sach. **A Complete Guide to Building and Plant Maintenance**, 2d ed.

TEACHING ACTIVITIES

1. Acquire information from various sources on porcelain surfaces, cleaning solutions, and how to clean porcelain properly. Make handout for student use.
2. Prepare area in shop or place porcelain is available to be used in demonstrating procedure for cleaning porcelain surfaces.
3. Outline on blackboard procedure and types of solutions used for cleaning porcelain surface. Explain procedure to student.
4. Demonstrate methods used for cleaning porcelain surfaces and describe types of solutions and their proper uses.
5. Present a review of procedures and allow student to clean porcelain surfaces.

PERFORMANCE OBJECTIVE 27

CRITERION-REFERENCED MEASURE

Questions

1. Surface must be rinsed completely with warm water. True or False?
2. Stains and rust are to be removed before cleaning porcelain surface. True or False?
3. Porcelain cleaned once should have a(n) _____ surface.

Answers

1. True
2. True
3. glossy

Practical Application

Have student clean porcelain surfaces.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 27 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 27
CLEAN PORCELAIN SURFACES

Student's Name _____ **Date** _____

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Checked complete surface for stains and rust.		
2. Applied stain and rust remover, if necessary.		
3. Washed with mild cleaning solution to remove any dirt.		
4. Rinsed complete surface with warm water.		
5. Dried complete surface with rag.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____ **Date** _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 28

TASK

Clean painted surfaces.

STANDARD OF PERFORMANCE OF TASK

Clean surfaces so that paint has a uniform color with no streaks, stains, spots, or smears.

SOURCE OF STANDARD

Brainard. *Handbook for School Custodians*, p. 145.

CONDITIONS FOR PERFORMANCE OF TASK

Soiled, painted surface
Dust cloth
Cleaning solution (stain remover)
Lint-free cloth
Detergent solution

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. List materials used for cleaning painted surfaces.
3. Explain procedures and demonstrate how to clean painted surfaces.
4. Explain importance of using proper cleaning solutions.
5. Demonstrate proper methods of using certain detergent solutions.

RESOURCES

1. Woodin and Hayes. *Home and Building Maintenance*.
2. Lander. *Home Repair and Maintenance*.

TEACHING ACTIVITIES

1. Acquire information and procedures from local painting suppliers and painters, in addition to book references; make handouts to be used in learning activities.
2. Prepare area in shop where painted surfaces can be stained with different materials for class demonstrations.
3. Demonstrate how to determine types of stains and cleaning solutions to be used.
4. Explain and demonstrate how to mix solutions with water and the proper method to use when cleaning painted surfaces.
5. Review procedures and allow students to pick proper cleaning solutions and clean a painted surface.

PERFORMANCE OBJECTIVE 28

CRITERION-REFERENCED MEASURE

Questions

1. Any cleaner can be used to clean spot or stains. True or False?
2. When washing you must start at the top of area and work down. True or False?
3. After washing a painted surface you must dry the surface with old rags. True or False?

Answers

1. False
2. False
3. False

Practical Application

Have student clean painted surfaces.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 28 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 28**CLEAN PAINTED SURFACES****Student's Name** _____**Date** _____**DIRECTIONS TO STUDENT**

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Wiped or dusted off the complete painted area.		
2. Analyzed marks or stains.		
3. Removed all stains and marks with proper cleaner.		
4. Used detergent solution; started at bottom of surface and worked upward.		
5. Immediately rinsed each washed area.		
6. Wiped dry with lint-free cloth.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____**Date** _____

DUTY CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS

PERFORMANCE OBJECTIVE 29

TASK

Fill in cracks in plaster using spackling compound.

STANDARD OF PERFORMANCE OF TASK

All defective plaster must be removed. All damaged areas must be filled and smoothed, and the patch blended into the surrounding surface.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Putty knife
Spackling compound
Mixing container
Scraper
Sponge
Sandpaper
Joint/crack tape

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when filling in cracks in plaster using spackling compound.
2. Explain workmanship standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction**, pp. 738-40.

TEACHING ACTIVITIES

1. Assign related reading materials in the class text and supplements from local supply outlets. Discuss factors that may contribute to cracks appearing in walls. Compare the characteristics of traditional plastered walls with those of walls sheathed with gypsum board, or so-called drywall materials. Have the student observe cracks that may appear in walls at home and in the immediate classroom area. Discuss causes and ways that such defects might be corrected.
2. Outline the tools and materials required for repairing cracks in wall surfaces.
3. Demonstrate mixing the spackling compound, applying it with a spatula, feathering the edges, and then applying abrasive paper for final smoothing after the area has dried.

PERFORMANCE OBJECTIVE 29

TEACHING ACTIVITIES continued

4. Present a review and summation of events using the blackboard.
5. Have the student complete the performance steps of the task.

CRITERION-REFERENCED MEASURE

Question

1.
 - a. When in a hurry, spackling compound may be used before removing loose material from the crack. True or False?
 - b. After undercutting the crack, the next step is to fill the crack with compound. True or False?
2. If a shrinkage occurs,
 - a. sand the surrounding areas down.
 - b. add more material.
3. Plastered walls may crack because of _____.
 - a. settlement
 - b. vibration
 - c. humidity
 - d. faulty construction
 - e. all of the above

Answers

1.
 - a. False
 - b. False
2.
 - b.
3.
 - e.

Practical Application

Have student fill in cracks in plaster using spackling compound.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 29 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 29
FILL IN CRACKS IN PLASTER USING SPACKLING COMPOUND

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed loose or deteriorated material from crack.		
2. Cleaned and dusted areas thoroughly.		
3. Undercut crack.		
4. Wet area to be patched.		
5. Mixed spackling compound according to directions.		
6. Filled crack with compound so it was slightly higher than the rest of the wall.		
7. Bridged along crack with jointer or crack tape if necessary.		
8. Struck off excess compound.		
9. Allowed patch to dry.		
10. Added more material if shrinkage occurred.		
11. Sanded patch level with wall.		
12. Cleaned all equipment promptly.		
13. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

CARE FOR BUILDING EXTERIOR AND GROUNDS

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 30

TASK

Install/replace glass.

STANDARD OF PERFORMANCE OF TASK

When completed, the glass will be secured to the sash; smooth and uniform fillets of putty/glazing compound will seal the glass without lumps or gaps.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Boiled linseed oil	Broken window pane
Glass cutter	with sash
Hammer	Glazier's tacks
Putty knife	Paint
Wood chisel	Primer
Saw horses/bench	Safety glasses
Replacement glass putty/glazing compound	Work gloves

ENABLING OBJECTIVES

1. Demonstrate use of glass cutter.
2. Demonstrate use of putty knife.
3. Identify personal safety equipment.
4. Read and interpret manufacturer's specifications.
5. Demonstrate safe work practices.

RESOURCES

1. Wagner. **Modern Carpentry**, Unit 11.
2. Baker. **Carpentry Fundamentals**, Chapter 9.

TEACHING ACTIVITIES

1. Assign student to read resource material.
2. Instruct student to remove any remaining broken glass from sash.
3. Demonstrate glass cutting to size.
4. Instruct student to remove old putty and prepare sash; prime, if necessary.
5. Explain the need for making the putty pliable.
6. Perform putty application at proper angle (fillet).

PERFORMANCE OBJECTIVE 30

CRITERION-REFERENCED MEASURE

Questions

1. When handling glass, protective hand and finger equipment should be worn
 - a. sometimes.
 - b. always.
 - c. if available.
2. To make putty more pliable, add boiled linseed oil. True or False?
3. Does glass expand with heat?
 - a. no
 - b. yes
 - c. sometimes

Answers

1. b.
2. True
3. a.

Practical Application

Have student install/replace glass.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 30 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 30

INSTALL/REPLACE GLASS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed any broken glass slivers, if necessary.		
2. Removed old putty with putty knife or wood chisel, if necessary.		
3. Painted with primer, if necessary.		
4. Selected glass. Laid out and cut, if necessary. Allowed 1/16" - 1/8" for expansion.		
5. Worked putty, glazing compound until pliable. Added boiled linseed oil, if necessary.		
6. Placed bead of putty/compound on shoulder of sash.		
7. Laid glass on bead of putty. Applied pressure until all edges of glass were sealed against the putty or glazing compound.		
8. Secured glass in sash with glazier's tacks.		
9. Applied putty to outside of glass. NOTE: Applied putty at an angle (fillet) from the outer edge of the sash to the inner point of the shoulder on which the glass rested.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 30
INSTALL/REPLACE GLASS

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
10. Painted sash, if necessary.		
11. Cleaned up.		
12. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature

Date

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 31

TASK

Patch composition shingle/built-up roof.

STANDARD OF PERFORMANCE OF TASK

When completed, the roof section will not leak and the roofing materials will be installed in accordance with manufacturer's specifications.

SOURCE OF STANDARD

Wisconsin Writing Team
Jansen. *Developing Troubleshooting Skills*, pp. 114-28.

CONDITIONS FOR PERFORMANCE OF TASK

Asphalt heater	Leaky roof section
Hammer	Felt paper
Manufacturer's installation specifications	Shingles/roofing
Nail puller	Roofing nails
Personal safety equipment	Asphalt tar
Roofing knife	Crushed slag/pea gravel
Wide putty knife/scrapper	Scaffolding

ENABLING OBJECTIVES

1. Identify personal safety equipment.
2. Demonstrate correct use of hand tools, hammer, and roofing knife.
3. Set up scaffolding.
4. Read and interpret manufacturer's specifications.
5. Demonstrate safe work practices.

RESOURCES

1. Wagner. *Modern Carpentry*, Unit 10, pp. 195-98.
2. Feirer et al. *Carpentry and Building Construction* (revised), Unit 36.
3. Baker. *Carpentry Fundamentals*, Chapter 8, pp. 167-71.

TEACHING ACTIVITIES

1. Instruct student to read resource material.
2. Demonstrate removal of old material to required standards.
3. Explain the difference between built-up material and shingles.
4. Demonstrate how to remove foreign material, lumps, and nails.
5. Demonstrate how shingles fit into existing pattern.

PERFORMANCE OBJECTIVE 31

CRITERION-REFERENCED MEASURE

Questions

1. Always remove foreign material from roof before reroofing. True or False?
2. New shingles should fit into existing pattern. True or False?
3. How much overlap is recommended for each layer of shingles?
4. When securing shingles to roof, only roofing nails should be used. True or False?

Answers

1. True
2. True
3. Six inches
4. True

Practical Application

Have student patch composition shingle/built-up roof.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 31 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 31
PATCH COMPOSITION SHINGLE/BUILT-UP ROOF

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed or loosened old roofing materials around leak to a minimum of eighteen inches on all sides. a. <u>Built-up Roof</u> . Removed crushed slag or pea gravel and all layers of asphalt and felt. Allowed for at least twelve inch lap on successive layers of patching felt. b. <u>Shingled Roof</u> . Removed defective shingles. Allowed for at least a six-inch end lap for each successive row.		
2. Removed foreign material such as asphalt lumps and nails which could puncture new roofing materials.		
3. Installed roofing materials. a. <u>Built-up Roof</u> . Applied two dry plies of 15 lb or one dry ply of 30 lb felt. Applied three successive layers of asphalt-saturated felt. Overlapped successive layers. Mopped down and sealed each layer in place with about 20 lb of hot asphalt over top surface with about 65 lb per 100 square feet. Applied crushed slag or pea gravel over top coat of asphalt at about 300-400 lb per 100 square feet respectively. b. <u>Shingled Roof</u> . Applied one layer of 15 lb felt paper. Installed asphalt shingles to fit into existing pattern of rows with top of last row fitting under existing row.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 31
PATCH COMPOSITION SHINGLE/BUILT-UP ROOF

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
4. Flashed around chimneys or vents with metal flashing or asphalt plastic cement, if necessary.		
5. Cleaned up.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 32

TASK

Unclog downspouts.

STANDARD OF PERFORMANCE OF TASK

Downspouts must carry normal flow of water; there can be no "new" dents and scratches in downspouts; area must be clear of rubbish.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Clogged downspouts
Wire probe
Garden hose/nozzle
Ladder
Stick/plumber's snake
Plastic plate scraper/whisk broom

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Explain and demonstrate proper steps to use in cleaning and removing debris from downspout.
3. Demonstrate proper procedure for working on a step ladder.
4. Using proper equipment, unclog downspout using correct procedures.

RESOURCE

Gladstone. The Simon and Schuster Complete Guide to Home Repair and Maintenance.

TEACHING ACTIVITIES

1. Prepare handouts listing the proper steps used for unclogging downspouts.
2. Set up area in shop where downspout can be set up and water can be used.
3. Demonstrate how to set ladder in place and run a plumber's snake or stick inside a downspout to break up debris that has clogged it.
4. Explain and demonstrate how to use water hose for washing out downspout.
5. Explain cleanup of area, then allow student to unclog prepared downspouts.

PERFORMANCE OBJECTIVE 32

CRITERION-REFERENCED MEASURE

Questions

1. Why is it necessary to clean out a downspout and run a line inside it?
2. List two tools or materials used in cleaning downspout when clogged.
3. Downspouts that are dented in various places are not reliable. True or False?

Answers

1. To keep debris from clogging downspout
2. Plumber's snake and stick
3. True

Practical Application

Have student unclog downspouts.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 32 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 32

UNCLOG DOWNSPOUTS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Assembled tools and equipment at work site.		
2. Probed from the bottom up, using wire, when unclogging vertical downspouts. Tried to gouge obstruction with wire.		
3. Connected garden hose to water and turned nozzle to solid stream if gouging failed.		
4. Inserted hose up downspout, nozzle first, until nozzle reached obstruction.		
5. Turned water on and increased pressure slowly.		
6. Turned water on full force and "gouged" nozzle into obstruction if blockage did not begin to break up. CAUTION: Care should be taken not to rupture side of pipe.		
7. Placed ladder so that both feet were flat on ground. Took care not to put too much weight on troughs.		
8. Climbed ladder and gouged downward with stick.		
9. Collected debris and carried it to dump.		
10. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 33

TASK

Free window from sash.

STANDARD OF PERFORMANCE OF TASK

Window must rise and shut with hand/wrist action only.

SOURCE OF STANDARD

West Virginia Writing Team
Brainard. *Handbook for School Custodians*, pp. 271-82.

CONDITIONS FOR PERFORMANCE OF TASK

Sticking window
Chisel
Putty knife
Hammer
Screwdriver (blade type)
Lubricant
Pry bar

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Demonstrate ability to use tools properly for this procedure.

RESOURCE

Lander. *Home Repair and Maintenance*.

TEACHING ACTIVITIES

1. Acquire information on causes for sticking window and proper procedure for correcting this problem.
2. Make arrangements to have a display of windows, and prepare windows for class by painting frame and allowing it to dry so student may see a cause for window sticking.
3. Once procedure has been explained, demonstrate the process for freeing window from sash.
4. After explaining procedure and demonstrating the proper methods, allow student to unstick window from sash.
5. Evaluate student by methods used and how safely the work was performed.

PERFORMANCE OBJECTIVE 33

CRITERION-REFERENCED MEASURE

Questions

1. To cut a bond from a window a(n) _____ or _____ must be used.
2. Force must be used to pry a window open. True or False?
3. Lubricating window channels is not necessary for smooth operation. True or False?

Answers

1. chisel, putty knife
2. True
3. False

Practical Application

Have student free window from sash.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 33 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 33

FREE WINDOW FROM SASH

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Collected tools and equipment.		
2. Located window and inspected.		
3. Cut paint bond with chisel or putty knife if paint bond was binding window.		
4. Checked to see if window was still stuck, and if window was stuck, gently pried upward with screwdriver until window was at desired height.		
5. Used wood chisel and hammer; chopped off area which was fouling window.		
6. Lubricated channels.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 34

TASK

Clean glass surface.

STANDARD OF PERFORMANCE OF TASK

The finished surface should have no streaks or glare.

SOURCE OF STANDARD

Ohio Trade and Industrial Education Service. *Custodial Training*, pp. 73-75.

CONDITIONS FOR PERFORMANCE OF TASK

Dirty glass surface
Brush
Putty knife
Sponge
Cleaning solution
Squeegee
Dry cloth

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Make selections of special cleaning solutions.
3. Explain and demonstrate methods used for cleaning glass.
4. Demonstrate correct cleanup after cleaning.

RESOURCES

1. Florman. *How to Clean Practically Anything*.
2. Moore. *How to Clean Everything; An Encyclopedia of What to Use and How to Use It*.

TEACHING ACTIVITIES

1. Gather different procedures and methods from supply companies, glass manufacturers, cleaning companies and library resources; prepare handout with necessary information.
2. Make arrangement for class to clean glass around campus during class time.
3. Demonstrate and explain why certain solutions are used on different types of glass.
4. Explain the importance of labeling solutions for safety precautions.

PERFORMANCE OBJECTIVE 34

TEACHING ACTIVITIES continued

5. Demonstrate methods for cleaning glass surfaces using proper cleaning solutions and other cleaning supplies.
6. Discuss cleanup and allow student to clean different types of glass surfaces.

CRITERION-REFERENCED MEASURE

Questions

1. There is only one type of glass surface. True or False?
2. Once window has been cleaned, allow water to dry and then use squeegee. True or False?
3. When applying cleaning solution to window a _____ is used.
 - a. paper towel
 - b. sponge
 - c. tissue
 - d. all of the above

Answers

1. False
2. False
3. b.

Practical Application

Have student clean glass surface.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 34 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 34

CLEAN GLASS SURFACE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Analyzed condition of the window or working area.		
2. Swept frame and panes with brush.		
3. Scraped off any loose or excess paint, then wiped clean.		
4. Applied cleaning solution to glass with sponge.		
5. Rinsed with clean sponge.		
6. Removed excess water with proper size squeegee.		
7. Wiped off excess water from frame, including corners, with dry cloth.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 35

TASK

Varnish wood surface.

STANDARD OF PERFORMANCE OF TASK

There can be no brush marks left on varnished surface; all of the surface must be covered.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Hammer
Nail set
Fine steel wool
Sandpaper (medium and fine)
Paintbrush
Drop cloth

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when varnishing wood surfaces.
2. Describe brushing techniques used for varnishing wood surfaces.
3. List tools and materials required for varnishing wood.
4. Describe the procedure for varnishing wood.
5. Explain workmanship standards.
6. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction**, pp. 814-16.

TEACHING ACTIVITIES

1. Assign reading material in the class text.
2. List on the blackboard the tools and materials required for varnishing wood.
3. Demonstrate the procedure and guide student through a practice session.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 35

CRITERION-REFERENCED MEASURE

Questions

1. List equipment necessary for varnishing a wooden surface.
2. If a paintbrush is to be used over a long period of time it is wise to choose a(n)
 - a. nylon bristle brush.
 - b. animal bristle brush.
3. Varnish should not be used around an open flame or sparks because it has a (low, high) flash point.

Answers

1. Equipment necessary for varnishing a wooden surface includes hammer, nail set, fine steel wool, sandpaper (medium and fine), paintbrush, drop cloth, and a covered metal container for drop cloth, rags, etc.
2. b.
3. low

Practical Application

Have student varnish wood surface.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 35 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 35

VARNISH WOOD SURFACE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Set all nails or fasteners.		
2. Cleaned wood with new wood cleaner or paint thinner.		
3. Filled nail or fastener holes.		
4. Sanded wood.		
5. Removed all dust and dirt.		
6. Stirred sanding sealer. NOTE: Did not shake sealer.		
7. Applied one coat.		
8. Sanded or polished with steel wool. NOTE: Did not shake varnish.		
9. Stirred varnish.		
10. Applied one coat of varnish. NOTE: Used pure bristle brush to apply varnish.		
11. Rubbed first coat down.		
12. Applied second coat.		
13. Cleaned brush.		
14. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 36

TASK

Sharpen lawn mower blade.

STANDARD OF PERFORMANCE OF TASK

Blade must not be burned; there can be no nicks; blade must have a keen edge.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Electric grinder

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when sharpening a lawn mower blade.
2. Explain worker's standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc. Rate Training Manual.**
2. Lander. **Home Repair and Maintenance**, pp. 142-43.

TEACHING ACTIVITIES

1. Assign resource reading for class discussion.
2. Assign selected students to interview a local lawn mower repair person and report information to the class.
3. Illustrate on the blackboard and explain the parts of a power grinder.
4. Acquire a small power lawn mower. Demonstrate the removal of the blade after first removing the spark plug wire and sharpen the lawn mower blade. Present a review and summation of events using the blackboard. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 36

CRITERION-REFERENCED MEASURE

Questions

1. How can you check the balance of the blade after sharpening?
2. Discuss the use of water in sharpening a blade.
3. List two safety precautions which should be observed when sharpening a blade.

Answers

1. Check the balance of the blade by putting a screwdriver blade or other rod-like object through the bolt hole of the lawn mower blade.
2. The blade should be dipped in water frequently during sharpening because overheating will ruin the metal.
3. Use a safety shield on the grinder and use safety glasses.

Practical Application

Have student sharpen lawn mower blades.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 36 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 36

SHARPEN LAWN MOWER BLADES

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Adjusted tool rest on grinder.		
2. Ground blade. CAUTION: Wore goggles.		
3. Dipped blade in water occasionally. NOTE: Blade was not burned.		
4. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 37

TASK

Clean metal surfaces using wire brush/steel wool.

STANDARD OF PERFORMANCE OF TASK

All metal surfaces cleaned by using wire brush/steel wool must be clear of dirt, debris, corrosion and loose paint; there can be no scarring of metal surfaces.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Steel wool (several grades)
Gloves
Eye protection
Rags

Putty knife
Steel brush
Dusting brush
Dustpan

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when cleaning metal surfaces with a wire brush/steel wool.
2. Describe working conditions that require the use of a wire brush/steel wool.
3. Explain worker's standards.
4. Demonstrate safe working practices.

RESOURCE

Naval Training Command. **Builder, Inc. Rate Training Manual.**

TEACHING ACTIVITIES

1. Obtain a variety of wire brush/steel wool units from local sources and use as visual aids for presentation of related information.
2. Demonstrate cleaning selected materials--parts of a lawn mower, auto, etc., with used wire brush/steel wool and encourage individual student participation. Emphasize safety apparel and eye protection.
3. Present a review and summation of events using the blackboard.
4. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 37

CRITERION-REFERENCED MEASURE

Questions

1. When cleaning old paint from a metal object use a _____ first.
 - a. fine grade of steel wool
 - b. wire brush
2. An electric drill with wire brush attachment may be used in cleaning metal surfaces. True or False?
3. If the metal surface is scarred or scratched by wire brush or steel wool, it can be easily restored to its original finish. True or False?

Answers

1. b.
2. True
3. False

Practical Application

Have student clean metal surfaces using wire brush/steel wool.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 37 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 37
CLEAN METAL SURFACES USING A WIRE BRUSH/STEEL WOOL

Student's Name _____ **Date** _____

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed loose dirt, rust, and debris with dusting brush. CAUTION: Wore eye protection and gloves.		
A. WIRE BRUSH:		
2. Used steel handbrush; scrubbed surface.		
3. Used electric drill and wire brush; moved brush slowly over area being cleaned.		
4. Dusted and wiped off area and cleaned up debris.		
5. Performed all tasks in a safe manner.		
B. STEEL WOOL:		
2. Scrubbed surface with coarse steel wool.		
3. Finished with finer grade steel wool. Did not scar metal surface with steel wool.		
4. Removed dust from surface.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____ **Date** _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 38

TASK

Clean metal surfaces using solvent.

STANDARD OF PERFORMANCE OF TASK

All metal surfaces must be cleaned of all substances to bare metal.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Hammer	Fiber brush
Rubber gloves	Wire brush
Eye protection	Bucket
Rubber clothing	Rags
(where necessary)	Chisel

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when cleaning a metal surface.
2. Identify conditions that would justify the use of a solvent as a cleaning agent.
3. Explain worker's standards.
4. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc, Rate Training Manual.**
2. Sach. **A Complete Guide to Building and Plant Maintenance**, 2d ed., pp. 47-49.

TEACHING ACTIVITIES

1. Acquire and organize materials that relate to cleaning with solvents.
2. Obtain basic materials and demonstrate the work activity--cleaning materials and a container may be available.
3. Present a review and summation of events using the blackboard.
4. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 38

CRITERION-REFERENCED MEASURE

Questions

1. It is necessary to wear safety glasses when cleaning metal. True or False?
2. If the outside aluminum walls of a building are dirty, it is best to clean the whole plant. True or False?
3. A good cleaning tool for cleaning metal is a wire brush. True or False?
4. A fiber brush is harsher and will clean better than a wire brush. True or False?
5. Sometimes washing with clean water is all that is needed to clean metal. True or False?

Answers

1. True
2. False
3. True
4. False
5. True

Practical Application

Have student clean metal surfaces using solvent.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 38 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 38
CLEAN METAL SURFACES USING SOLVENT

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed loose dirt and debris.		
2. Mixed solvent solution according to direction on manufacturer's label. CAUTION: Made sure workplace had adequate ventilation. Wore protective equipment. Shut off power on appliances and motors.		
3. Scrubbed surface with solvent solution.		
4. Rinsed with clean water and wiped dry.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 39

TASK

Caulk doors and windows.

STANDARD OF PERFORMANCE OF TASK

All caulked areas must be filled to the levels of the surface around them. There can be no "spilled over" compound on the surrounding surface. When building is tightly closed, there can be no air entering or leaving the structure through the filled crack.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Oakum/cotton rope
Caulking gun with cartridges
Putty knife
Knife
Wire brush
Hammer
Chisel

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when caulking doors and windows.
2. Identify conditions that make repairs necessary.
3. Explain worker's standards.
4. Demonstrate safe working practices.

RESOURCES

1. Oravetz. *Building Maintenance*, pp. 203-5.
2. Naval Training Command. *Builder Inc, Rate Training Manual*.

TEACHING ACTIVITIES

1. Acquire reference materials that include local supply source handouts, and organize a lecture with related activities.
2. Assign reading units in the class text and available school resources.
3. Acquire a caulking gun and a painter's cartridge and demonstrate the preparation and use of the caulking unit.
4. Encourage student to participate in a hands-on series of exercises --guide individual through repair sequences.
5. Present a review and summation of events using the blackboard.
6. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 39

CRITERION-REFERENCED MEASURE

Questions

1. The use of calk material is necessary in construction
 - a. to improve the appearance of a building.
 - b. to prevent warping of boards.
 - c. to prevent water and air leakage.
 - d. all of the above
2. In order to save caulking material, it is best to fill deep cracks with
 - a. primer paint.
 - b. oakum.
 - c. linseed oil.
 - d. sawdust.
3. Caulking can be applied with a
 - a. caulking gun.
 - b. putty knife.
 - c. both a and b.

Answers

1. c.
2. b.
3. c.

Practical Application

Have student caulk doors and windows.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 39 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 39

CAULK DOORS AND WINDOWS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Cleaned joint to be caulked.		
2. Filled large cavities with oakum or cotton rope.		
3. Placed caulking cartridge in caulking gun.		
4. Cut off tip to desired width and angle.		
5. Punctured cartridge seal.		
6. Started at one corner and gently squeezed gun trigger while slowly moving gun in one direction.		
7. Repeated Item 6 on all joints.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 40

TASK

Prepare seedbed.

STANDARD OF PERFORMANCE OF TASK

Seedbed must be cultivated to a depth of three to six inches. Soil disinfection operations must be completed, and organic matter, starter fertilizer, and pre-plant herbicide added to meet the recommended environmental conditions for particular plant species.

SOURCE OF STANDARD

Illinois Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Organic matter
Lime
Starter fertilizer
Sulfur

Pre-plant herbicide
Seedbed
Chemical soil sterilants
Soil pasteurization system

ENABLING OBJECTIVES

1. Recall the purpose of a seedbed.
2. Demonstrate safe working practices.

RESOURCES

1. Nelson, K. Greenhouse Management for Flower and Plant Production.
2. Ball. Ball Redbook Greenhouse Growing, 14th ed.
3. Nelson, K. Flower and Plant Production in the Greenhouse.
4. Nelson, N. Greenhouse Operations and Management.
5. Ware. Complete Guide to Pest Control.
6. Page and Thomson. Insecticide, Herbicide, Fungicide Quick Guide.
7. Conway. Pest and Pathogen Control: Strategy, Tactics and Policy Models.
8. Haskell. Pesticide Application: Principles and Practices.
9. Yepsen. The Encyclopedia of Natural Insect and Disease Control.
10. Foth. Fundamentals of Soil Science, 7th ed.
11. Curtis and Courson. Outline of Soil Fertility and Fertilizers.
12. Tisdale. Soil Fertility and Fertilizers, 4th ed.
13. Hartman and Kester. Plant Propagation Principles and Practices, 4th ed.
14. Young. Collecting, Processing and Germinating Seeds of Wildland Plants.
15. Bubel. Seed-Starter's Handbook.

PERFORMANCE OBJECTIVE 40

TEACHING ACTIVITIES

1. Discuss the importance of the seedbed soil condition for seed germination.
2. Show examples of soil.
3. Question student about the suitability of a variety of soil for a seedbed.
4. Show examples of soil amendments.
5. Question student about the suitability of a variety of soil amendments for improving the soil texture of a seedbed.
6. Demonstrate disinfestation procedures.
7. Demonstrate application of starter fertilizers.
8. Demonstrate adjustment of the soil pH.
9. Demonstrate application of pre-plant herbicides.
10. Assign each student a seedbed to prepare.

CRITERION-REFERENCED MEASURE

Questions

1. It is more expensive to obtain plants by growing them in a seedbed than buying them at a retail market. True or False?
2. Before planting a seedbed it is important to disinfect the soil for plants to grow well. True or False?
3. The seedbed should be cultivated to a depth of one seed per half inch. True or False?

Answers

1. False
2. True
3. False

Practical Application

Have student prepare a seedbed.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 40 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 40

PREPARE A SEEDBED

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Cultivated seedbed to a depth of three to six inches.		
2. Added organic matter to improve soil texture, if needed.		
3. Disinfested the seedbed to control soil insects, disease, and weed seeds, if needed. CAUTION: Followed manufacturer's recommendations and safety precautions for pasteurization operations.		
4. Applied starter fertilizer.		
5. Adjusted pH of growing media, if needed.		
6. Applied pre-plant herbicide if recommended for particular plant species and environmental conditions.		
7. Incorporated organic matter, fertilizer, lime or sulfur, and herbicide.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 41

TASK

Fertilize plants.

STANDARD OF PERFORMANCE OF TASK

Fertilizer must be uniformly applied to plants at recommended rate for particular plant species. Safety precautions and all manufacturer's recommendations must be observed during application process.

SOURCE OF STANDARD

Illinois Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Plants
Punch-bar
Fertilizer
Proportioner
Fertilizer injector
Fertilizer spreader
Fertilizer applicator

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Recall units of measurement (weight/volume).

RESOURCES

1. McVickar and Walker. **Using Commercial Fertilizers.**
2. Curtis and Courson. **Outline of Soil Fertility and Fertilizers.**
3. Tisdale. **Soil Fertility and Fertilizers**, 4th ed.
4. Israelsen and Hansen. **Irrigation Principles and Practices.**
5. Irrigation system operating instructions.
6. Fertilizer spreader operating instructions.

TEACHING ACTIVITIES

1. List methods used to fertilize plants.
2. Present lecture on the types of plants fertilized using the list from Teaching Activity 1.
3. Discuss the importance of avoiding application of fertilizer on plants when media is dry.
4. Present lecture on the function of a fertilizer injector/proportioner.
5. Demonstrate how to attach fertilizer injector/proportioner to irrigation system.
6. Demonstrate how to set injector/proportioner.

PERFORMANCE OBJECTIVE 41

TEACHING ACTIVITIES continued

7. Question student on how to determine if injector/proportioner is working.
8. Assign student to irrigate the plants.
9. Demonstrate how to disconnect the injector/proportioner and flush the irrigation system.
10. Demonstrate how to operate a fertilizer spreader.
11. Demonstrate how to set the rate at which the fertilizer is released.
12. Question student on how to calibrate a fertilizer spreader.
13. Assign student to calibrate a fertilizer spreader.
14. Demonstrate how to punch holes around the circumference of a plant.
15. Assign student to place a predetermined amount of fertilizer on each hole.
16. Demonstrate how to close the holes.
17. Assign student a plant(s) to fertilize.

CRITERION-REFERENCED MEASURE

Questions

1. Fertilizer should not be added to the plant media unless it is moist. Why?
 - a. Because the flowers won't bloom
 - b. Because the stems will break in two
 - c. To avoid root burn
2. Fertilizer for a row of plants may be placed at the end of the row in one spot for best results. True or False?
3. Of the following, which three are methods for applying fertilizer?
 - a. Liquid application
 - b. Paste application with hydrogen peroxide
 - c. Top-dressing with dry fertilizer
 - d. Punch bar method

Answers

1. c.
2. False
3. a., c., and d.

Practical Application

Have student fertilize plants.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 41 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 41

FERTILIZE PLANTS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Identified plants to be fertilized. NOTE: Did not fertilize plants unless media was moist, to avoid root burn.		
2. Identified method of applying fertilizer. A. Made liquid application of fertilizer. 1. Attached fertilizer proportioner or injector and fertilizer concentrate to irrigation system. CAUTION: Followed manufacturer's recommendations and safety precautions for operation of proportioner or injector.		
2. Set proportioner or injector at pre-determined ratio.		
3. Turned on irrigation system.		
4. Checked irrigation water to ensure proportioner/injector was working. NOTE: Dye was added to fertilizer concentrate so fertilizer could be detected in irrigation water.		
5. Irrigated plants uniformly.		
6. Turned off irrigation system.		
7. Disconnected proportioner or injector.		
8. Flushed irrigation lines to remove any remaining fertilizer.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 41

FERTILIZE PLANTS

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
B. Top-dressed with dry or slow-release fertilizer. NOTE: Fertilizer was broadcast applied in bands near the plant row, or injected onto the medium in the container. 1. Calibrated fertilizer spreader, applicator, or injector.		
2. Filled fertilizer spreader, applicator, or injector with predetermined amount of fertilizer.		
3. Applied fertilizer uniformly. NOTE: Followed manufacturer's recommendations and safety precautions while operating fertilizer spreader, applicator, or injector.		
4. Cleaned fertilizer spreader, applicator, or injector.		
5. Watered fertilizer into the soil.		
C. Used punch-bar method to apply dry or slow-release fertilizer. 1. Punched predetermined number of holes at uniform intervals around the circumference of the plant near the dripline.		
2. Placed predetermined amount of fertilizer in each hole.		
3. Closed hole by pressing surrounding soil with foot.		
3. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 42

TASK

Spray plants for pest control.

STANDARD OF PERFORMANCE OF TASK

Pesticide must be mixed and applied according to manufacturer's recommendations and safety precautions. Plants must be sprayed uniformly at specified rate.

SOURCE OF STANDARD

Illinois Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Pesticide
Sprayer
Plants
Protective clothing
Warning sign

ENABLING OBJECTIVES

1. Read pesticide label.
2. Read spraying equipment operating instructions.
3. Evaluate weather conditions.
4. Recall protective clothing to wear when applying toxic chemicals.
5. Recall regulations regarding restricted use pesticides.
6. Demonstrate safe working practices.

RESOURCES

1. Ball. **Ball Redbook Greenhouse Growing**, 14th ed.
2. Nelson, K. **Greenhouse Management for Flower and Plant Production**.
3. Langhans. **Greenhouse Management**.
4. Nelson, P. **Greenhouse Operations and Management**.
5. Boodley. **The Commercial Greenhouse**.
6. Pesticide label.
7. Spraying equipment operating instructions.

TEACHING ACTIVITIES

1. Question student on the possible results of incomplete and/or improper spraying.
2. Present lecture on the level of toxicity of the pesticide to be sprayed.
3. Present lecture on the environmental hazards of pesticides.
4. Discuss the importance of applying pesticides according to label directions.

PERFORMANCE OBJECTIVE 42

TEACHING ACTIVITIES continued

5. Present lecture on the use of spreader stickers.
6. Question student on the protective clothing to wear when spraying plants.
7. Question student on the safety precautions to take to protect others when applying pesticides.
8. Present lecture on first aid for accidents involving pesticides.
9. Present lecture on weather conditions that are suitable for applying pesticides.
10. Question student on regulations regarding pesticide use.
11. Demonstrate how to dilute a pesticide formulation.
12. Discuss importance of adding pesticides to the tank in the correct order.
13. Present lecture on spraying equipment selection.
14. Demonstrate how to regulate the sprayer pressure.
15. Demonstrate how to calibrate the sprayer.
16. Demonstrate how to apply the pesticide to the plants.
17. Discuss the importance of uniform application when spraying plants for pest control; discuss advantages of spreader stickers.
18. Discuss the importance of posting warning signs.
19. Demonstrate how to rinse and clean the spraying equipment.
20. Present lecture on the proper disposal of leftover pesticide solution.
21. Evaluate student's ability to don protective clothing.
22. Question student on safety precautions he/she would take to protect others when spraying plants.
23. Assign student a block of plants to spray for pest control.

CRITERION-REFERENCED MEASURE

Questions

1. It is best to spray pesticides on a windy day so that the solution will dry on the leaves faster. True or False?
2. It is best to choose a rainy day to spray pesticides so the solution will go evenly into the soil. True or False?
3. It is very important to wear protective clothing when spraying plants. True or False?

Answers

1. False
2. False
3. True

PERFORMANCE OBJECTIVE 42

CRITERION-REFERENCED MEASURE continued

Practical Application

Have student spray plants for pest control.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 42 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 42

SPRAY PLANTS FOR PEST CONTROL

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Read label of specified pesticide. CAUTION: Followed all manufacturer's recommendations and safety precautions. (The label will specify whether the pesticide is for general or restricted use. A restricted use pesticide can be used only by certified applicators or by people who are directly supervised by certified applicators.)		
2. Checked suitability of weather conditions for pesticide application.		
3. Wore gloves, goggles, and other recommended protective clothing for specified pesticide.		
4. Diluted pesticide formulation to calculated concentration. CAUTION: Followed manufacturer's directions for mixing pesticide. NOTE: Better results may be obtained by using a spreader sticker.		
5. Selected spray equipment that would provide uniform coverage. A. Sprayer B. Nozzle C. Pressure		

CHECKLIST FOR PERFORMANCE OBJECTIVE 42

SPRAY PLANTS FOR PEST CONTROL

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
6. Poured diluted pesticide into sprayer. CAUTION: Some pesticide formulations must be constantly agitated.		
7. Regulated sprayer's pressure according to manufacturer's recommendations.		
8. Calibrated sprayer.		
9. Posted signs warning that area was unsafe to enter.		
10. Applied pesticide uniformly to plants at specified rate. A. Covered both top and bottom sides of leaves. B. Covered foliage from top to bottom of plant.		
11. Rinsed sprayer and nozzles upon completion.		
12. Removed protective clothing.		
13. Washed all exposed areas of skin.		
14. Removed signs after required waiting period.		
15. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 43

TASK

Renovate turf.

STANDARD OF PERFORMANCE OF TASK

The site to be renovated must be sprayed with a herbicide. Manufacturer's recommendations and safety precautions must be observed during application and the waiting period. The specified turfgrass must be planted during the recommended season at the recommended rate. The site must be irrigated as needed until turfgrass is established.

SOURCE OF STANDARD

Illinois Writing Team
Emmons. *Turfgrass Science and Management*.

CONDITIONS FOR PERFORMANCE OF TASK

Rake
Site
Turfgrass seed
Herbicide
Overseeder/diskseeder
Vertical mower

ENABLING OBJECTIVES

1. Recall factors to consider when selecting turfgrass species.
2. Demonstrate safe working practices.

RESOURCES

1. Emmons. *Turfgrass Science and Management*.
2. MacCaskey. *Lawns and Ground Covers: How to Select, Grow, and Enjoy*.
3. Ashton and Crafts. *Modes of Action of Herbicides*, 2d ed.
4. Page and Thomson. *Insecticide, Herbicide, Fungicide Quick Guide*.
5. Overseeder or diskseeder operating instructions.

PERFORMANCE OBJECTIVE 43

TEACHING ACTIVITIES

1. Outline steps used to renovate turf.
2. Present lecture on determining seeding rate.
3. Present lecture on calibrating seeding equipment.
4. Present lecture on the season(s) of the year most suitable for seeding.
5. Question student on application of herbicide safety.
6. Show examples of turf needs renovation.
7. Assign student to apply a herbicide to the turf.
8. Question student on cultivation equipment safety.
9. Assign student to cultivate an area of the turf.
10. Demonstrate how to rake the thatch loosened by the cultivator.
11. Demonstrate how to replant the cultivated area using an overseeder or diskseeder.
12. Assign student to irrigate the seeded area.
13. Monitor student as he/she practices renovating turf.
14. Assign student an area of turf to renovate.

CRITERION-REFERENCED MEASURE

Questions

1. The first step in renovating turfgrass is to plant the seed. True or False?
2. Seed should be planted with the overseeder or diskseeder in a criss-cross pattern for even distribution. True or False?
3. Frequency of irrigation may be reduced after turfgrass seed has germinated, but maintained until turfgrass is established. True or False?

Answers

1. False
2. True
3. True

Practical Application

Have student renovate turf.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 43 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 43

RENOVATE TURF

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Identified the particular turf species or cultivar that would be replanted.		
2. Identified the recommended seeding rate for the specific species of turfgrass planted.		
3. Planned renovation for suitable season of year, generally late summer, early fall, or early spring.		
4. Sprayed the site to be renovated with a herbicide to kill present vegetation. CAUTION: Manufacturer's recommendations and safety precautions were observed.		
5. Followed manufacturer's recommended waiting time, generally at least 7 days, before replanting.		
6. Replanted site with turfgrass. A. Used an overseeder or diskseeder to replant site. CAUTION: Manufacturer's recommendations and safety precautions were observed. B. Applied 1/2 of the seed in an east-west direction and 1/2 in a north-south direction for even distribution.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 43

RENOVATE TURF

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
7. Raked any thatch loosened by the vertical mower blades on the overseeder. NOTE: Seed must be in close contact with soil to receive moisture and germinate.		
8. Irrigated the turfgrass. A. Irrigated frequently until the turfgrass seed had germinated. B. Reduced frequency of irrigation after turfgrass seed had germinated, but continued to irrigate until turfgrass was established.		
9. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY CARE FOR BUILDING EXTERIOR AND GROUNDS

PERFORMANCE OBJECTIVE 44

TASK

Reseed worn spots on turf.

STANDARD OF PERFORMANCE OF TASK

Any existing grass on worn spot must be closely mowed to a height of 1/2 inch. The specified turfgrass must be planted during the recommended season at the recommended seeding rate. The site must be irrigated as needed until new plants are established.

SOURCES OF STANDARD

Illinois Writing Team
Turgeon et al. *Illinois Lawn Care and Establishment*.
Emmons. *Turfgrass Science and Management*.

CONDITIONS FOR PERFORMANCE OF TASK

Rake	Core cultivator
Roller	Broadleaf herbicide
Drag mat	Overseeder or diskseeder
Turfgrass seed	Turf site with worn spots
Vertical mower	

ENABLING OBJECTIVES

1. Recall factors to consider when selecting turfgrass species.
2. Demonstrate safe working practices.

RESOURCES

1. Emmons. *Turfgrass Science and Management*.
2. MacCaskey. *Lawns and Ground Covers: How to Select, Grow, and Enjoy*.
3. Turgeon et al. *Illinois Lawn Care and Establishment* (Circular 1082).
4. Ashton and Crafts. *Modes of Action of Herbicides*, 2d ed.
5. Page and Thomson. *Insecticide, Herbicide, Fungicide Quick Guide*.
6. Overseeder or diskseeder operating instructions.

TEACHING ACTIVITIES

1. Outline steps used to reseed worn spot on turf.
2. Present lecture on selection of the turfgrass species or cultivar.
3. Present lecture on calculating seed rates.
4. Present lecture on the season of the year most suitable for seeding.
5. Question student on application of broadleaf herbicide safety.
6. Show examples of worn spots in turfgrass.

PERFORMANCE OBJECTIVE 44

TEACHING ACTIVITIES continued

7. Question student on mower safety.
8. Assign student to mow a worn spot.
9. Question student on the purpose of mowing the worn spot before sowing the seed.
10. Question student on cultivation equipment safety.
11. Assign student to cultivate a worn spot.
12. Demonstrate how to sow the seed by hand.
13. Demonstrate how to sow seed using an overseeder or diskseeder.
14. Assign student to irrigate the seeded area.
15. Monitor class as they practice reseeding worn spots.
16. Assign student a worn spot to reseed.

CRITERION-REFERENCED MEASURE

Questions

1. The first step in reseeding worn spots on turf is to identify the turf species species that will be replanted. True or False?
2. Existing grass should not be mowed before planting the seed. True or False?
3. Seed may be sowed by hand or mechanically with a diskseeder or overseeder. True or False?
4. Herbicide should be used the day before planting grass seed. True or False?

Answers

1. True
2. False
3. True
4. False

Practical Application

Have student reseed worn spots on turf.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 44 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 44

RESEED WORN SPOTS ON TURF

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Identified the particular turf species or cultivar that would be replanted.		
2. Identified the recommended seeding rate for the specific turfgrass planted.		
3. Planned reseeding for suitable season of the year; generally late summer, early fall, or early spring.		
4. Treated worn spots with broadleaf herbicide if broadleaf weeds were a problem. A. Applied broadleaf herbicide. CAUTION: Followed manufacturer's recommendations and safety precautions. B. Applied early enough to provide the allotted waiting period before planting time.		
5. Set lawn mower blade at its lowest setting.		
6. Mowed existing grass to a low height--approximately 1/2 inch.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 44

RESEED WORN SPOTS ON TURF

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
7. Sowed seed in the worn spot area. NOTE: Seed was in close contact with soil particles. A. Mechanically: 1. Applied seed using a diskseeder or overseeder.		
2. Applied 1/2 of the seed in an east-west direction and 1/2 in a north-south direction, for even distribution.		
B. Seeding by hand: 1. Cultivated worn area using a core cultivator or vertical mower several times.		
2. Used vertical mower or drag mat to break up extracted soil plugs. NOTE: Small areas were dug by hand.		
3. Seeded area at a heavy rate.		
4. Raked seed in soil.		
5. Rolled area lightly.		
6. Topped dress area, if possible.		
7. Irrigated as needed until new plants were well established.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR
INTERIOR AND EXTERIOR OF BUILDINGS**

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR
AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 45

TASK

Cut lumber to size with radial arm saw.

STANDARD OF PERFORMANCE OF TASK

When completed, the workpiece must be within 1/16" of specified dimensions.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Pencil
Radial arm saw
Rule or measuring tape
Personal safety equipment
Lumber
Dimensioned sketch

ENABLING OBJECTIVES

1. Demonstrate correct use of power equipment and radial arm saw.
2. Correctly read measuring devices.
3. Interpret sketches and dimensions.
4. Demonstrate safe work practices.

RESOURCES

1. Wagner. *Modern Carpentry*, pp. 37-39.
2. Feirer and Hutchings. *Carpentry and Building Construction* (revised), Unit 9, pp. 124-37.

TEACHING ACTIVITIES

1. Instruct student to read resource material.
2. Demonstrate measuring skills.
3. Discuss safe use of radial arm saw.
4. Explain procedure before making adjustments.
5. Explain the difference between working edge and working end.
6. Emphasize checking measurement for accuracy.

PERFORMANCE OBJECTIVE 45

CRITERION-REFERENCED MEASURE

Questions

1. The radial arm saw is a portable tool. True or False?
2. The radial arm saw can be turned to different angles. True or False?
3. Personal protective equipment should be used while assisting someone using the radial arm saw. True or False?
4. Always check dimensions after cutting with the radial arm saw. True or False?

Answers

1. False
2. True
3. True
4. True

Practical Application

Have student cut lumber to size with radial arm saw.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 45 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 45
CUT LUMBER TO SIZE WITH RADIAL ARM SAW

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Selected working edge and working end.		
2. Laid out stock.		
3. Adjusted radial arm to the rip position and test cut a scrap piece. Adjusted if necessary.		
4. Ripped lumber to width.		
5. Adjusted radial arm to the cutoff position.		
6. Square cut working end.		
7. Set stop at specified length. Cut to length, checked, and made adjustments as necessary. CAUTION: Shut off saw before making adjustments.		
8. Cut the piece(s) to length.		
9. Cleaned up.		
10. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 46

TASK

Cut lumber to size with portable power saw.

STANDARD OF PERFORMANCE OF TASK

When completed, the workpiece must be within 1/16" of specified dimensions.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Rule/measuring tape	Lumber
Saw horse/work bench	Dimensioned sketch
Personal safety equipment	Framing square
Portable power saw with ripping gauge	Pencil

ENABLING OBJECTIVES

1. Read and interpret diagrams and sketches.
2. Correctly read measuring devices.
3. Identify correct personal safety equipment.
4. Demonstrate safe work practices.

RESOURCES

1. Wagner. *Modern Carpentry*, Unit 2, pp. 27-28.
2. Feirer and Hutchings. *Carpentry and Building Construction* (revised), Unit 12, pp. 165-70.

TEACHING ACTIVITIES

1. Instruct student to read resource material.
2. Discuss safe use of portable saw.
3. Demonstrate measuring skills.
4. Explain how to adjust ripping gauge.
5. Demonstrate making cut with portable saw.
6. Emphasize the need to check measurements for accuracy.

PERFORMANCE OBJECTIVE 46

CRITERION-REFERENCED MEASURE

Questions

1. You should always wear eye protection when using portable power saw. True or False?
2. While adjusting ripping gauge you should _____.
3. While cutting with portable power saw, materials should be held securely. True or False?
4. When making measurements, the tool to use is a _____.
 - a. rule
 - b. tape
 - c. square
 - d. all of the above

Answers

1. True
2. unplug power source
3. True
4. d.

Practical Application

Have student cut lumber to size with portable power saw.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 46 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 46
CUT LUMBER TO SIZE WITH PORTABLE POWER SAW

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Selected working edge and working end.		
2. Laid out stock.		
3. Cut working end.		
4. Cut to length.		
5. Adjusted ripping gauge.		
6. Ripped to width.		
7. Cleaned up.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 47

TASK

Cut lumber to size with handsaw.

STANDARD OF PERFORMANCE OF TASK

When completed, the cut piece(s) should be within 1/16" of specifications.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Hand cross cut saw
Drawing
Framing square
Pencil
Personal safety equipment

Hand rip saw
Rule
Saw horse/bench
Lumber
Dimensioned sketch

ENABLING OBJECTIVES

1. Demonstrate correct use of hand tools, hand saw, and square.
2. Read measuring device correctly.
3. Identify correct personal safety equipment.
4. Demonstrate safe work practices.

RESOURCES

1. Wagner. *Modern Carpentry*, pp.10-11.
2. Feirer and Hutchings. *Carpentry and Building Construction* (revised), pp. 114-15.

TEACHING ACTIVITIES

1. Instruct student to read resource material.
2. Instruct student to perform square cut after selecting hand saw.
3. Explain the importance of square edge.
4. Explain the difference in securing work to bench or saw horse.
5. Show how to make proper measurements.
6. Explain how to select working surface.

PERFORMANCE OBJECTIVE 47

CRITERION-REFERENCED MEASURE

Questions

1. What is a saw horse, and what is it used for?
2. A _____ is needed to make dimension cuts.
 - a. rule
 - b. square
 - c. plane
 - d. saw
3. In order to finish workpiece to specifications a(n) _____ is needed.
4. The teeth should be sharp and clean for best results. True or False?

Answers

1. A saw horse is a horizontal portable bench used for sawing.
2. d.
3. dimensioned sketch
4. True

Practical Application

Have student cut lumber to size with handsaw.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 47 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 47

CUT LUMBER TO SIZE WITH HANDSAW

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Selected working surface and mark.		
2. Laid out working edge.		
3. Laid out working end square with working edge.		
4. Laid out second end.		
5. Cut to length 1/16" with cross cut saw.		
6. Laid out width.		
7. Sawed to width 1/16" with rip saw.		
8. Cleaned up.		
9. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 48

TASK

Cut irregular shapes with band saw.

STANDARD OF PERFORMANCE OF TASK

When completed, the cut piece(s) must be within 1/16" of the pattern.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Band saw
Pattern
Pencil
Lumber
Irregular pattern
Personal safety equipment

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Demonstrate correct use of band saw.
3. Identify correct personal protective equipment.
4. Correctly identify drafting tools.

RESOURCE

Feirer and Hutchings. **Carpentry and Building Construction** (revised).

TEACHING ACTIVITIES

1. Show how to draw patterns with pencil.
2. Instruct student to follow pattern outline within tolerance.
3. Demonstrate ability to cut irregular shape.
4. Explain and emphasize work pressure on saw blade.
5. Explain proper setting of clearance.

PERFORMANCE OBJECTIVE 48

CRITERION-REFERENCED MEASURE

Questions

1. To trace pattern on stock would a pattern and pencil, or personal safety equipment and band saw be needed?
2. The pressure on saw blade is very important. True or False?
3. When work is completed one should always _____.
4. Why should tension be released on blade after use?

Answers

1. Pattern and pencil
2. True
3. clean up
4. To relieve stress

Practical Application

Have student cut irregular shapes with band saw.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 48 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 48

CUT IRREGULAR SHAPES WITH BAND SAW

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Traced pattern on stock.		
2. Set upper and lower band saw guides to 1/4"-1/2" clearance over material cut.		
3. Selected blade in accordance with radii of cuts.		
4. Adjusted tension on band saw blade.		
5. Turned on/set rheostat for material.		
6. Made release cuts.		
7. Cut irregular shapes.		
8. Shut off machine. Applied brake, if so equipped.		
9. Removed waste.		
10. Released tension on saw blade.		
11. Cleaned up.		
12. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 49

TASK

Cut lumber to size with table saw.

STANDARD OF PERFORMANCE OF TASK

When complete, the cut stock must be within 1/16" of specified dimensions.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Personal safety equipment
Push stick
Rip fence
Rule

Square
Table saw (adequately guarded)
Lumber
Dimensioned sketch

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Identify proper personal safety equipment.
3. Read and interpret sketches and drawings.

RESOURCE

Feirer and Hutchings. **Carpentry and Building Construction** (revised), Unit 11, p. 148.

TEACHING ACTIVITIES

1. Instruct student to read and discuss resource material.
2. After reading Item 1, direct student to identify hand tools.
3. Demonstrate measuring skills.
4. Demonstrate how to perform squaring technique.
5. Demonstrate how to make cut using table saw.
6. Show how to check measurements for accuracy.

PERFORMANCE OBJECTIVE 49

CRITERION-REFERENCED MEASURE

Questions

1. To check squareness of work you would need a(n) _____.
2. Before cutting lumber with table saw you should always use
 - a. safety equipment.
 - b. push stick.
 - c. saw guard.
 - d. all of the above
3. The saw should be turned off before making adjustments. True or False?
4. When cutting stock to dimension with table saw, the allowable tolerance is
 - a. $\pm 1/32''$
 - b. $\pm 1/16''$
 - c. $1/8''$ over
 - d. $1/4''$ under

Answers

1. square
2. d.
3. True
4. b.

Practical Application

Have student cut lumber to size with table saw.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 49 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 49

CUT LUMBER TO SIZE WITH TABLE SAW

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Selected working edge and working end.		
2. Laid out stock.		
3. Set rip fence to desired width of material-- 1/16" over finished dimension. Checked dimension and squareness.		
4. Turned on saw.		
5. Ripped scrap piece to width and adjusted fence, if necessary. CAUTION: Shut off saw before making adjustments.		
6. Ripped pieces of material desired.		
7. Shut off saw.		
8. Cleaned up.		
9. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 50

TASK

Drill holes in metal with portable device.

STANDARD OF PERFORMANCE OF TASK

When completed, the hole(s) will be drilled ± 0.010 " of specifications.

SOURCES OF STANDARD

Wisconsin Writing Team
Oberg et al. **Machinery's Handbook**, 21st ed., p. 1539.

CONDITIONS FOR PERFORMANCE OF TASK

Center punch	Prick punch
Deburring tool	Scribe
Drill motor (portable drill)	Wiping rags
Drill tables	Work-holding device
Drills	Workpiece
Personal safety equipment	Specification sheet
	Lubricants

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Identify correct personal protective equipment.

RESOURCE

Wagner. **Modern Carpentry**.

TEACHING ACTIVITIES

1. Demonstrate correct method for center punching.
2. Discuss the difference between hand held power drill and bench drill.
3. Demonstrate the securing of work in vise.
4. Emphasize the need for drilling lead or pilot hole.
5. Explain the importance of selecting the proper drills.

PERFORMANCE OBJECTIVE 50

CRITERION-REFERENCED MEASURE

Questions

1. While drilling one should always use personal _____.
2. If drilling a large hole, a pilot hole should be drilled first.
 - a. Always
 - b. Sometimes
 - c. Never
3. Lubricant is used to
 - a. make the drill run faster.
 - b. reduce heat friction.
 - c. make the hole smooth.

Answers

1. safety equipment
2. a.
3. b.

Practical Application

Have student drill holes in metal with portable device.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 50 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 50
DRILL HOLES IN METAL WITH PORTABLE DEVICE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Secured workpiece in holding device.		
2. Laid out hole(s) with scribe, used a prick punch, and rechecked.		
3. Used a center punch.		
4. Selected pilot drill.		
5. Chucked pilot drill.		
6. Drilled pilot hole. Checked alignment.		
7. Removed pilot drill.		
8. Selected drill for intermediate or final hole as necessary.		
9. Chucked drill.		
10. Drilled hole to specifications. Lubricated if necessary.		
11. Deburred if necessary.		
12. Cleaned up.		
13. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 51

TASK

Remove damaged screws and other threaded hardware.

STANDARD OF PERFORMANCE OF TASK

The threaded hardware must be removed and the fit of the original tapped hole maintained.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Annealing or normalizing
equipment
Center punch
Drill assortment
Electric drill motor
Lock
Personal safety equipment
Screw extractors

Tap wrenches
Taps
Wiping rags
Work-holding device
Specifications
Lubricant
Machine/equipment with
damaged screw(s) or other
threaded hardware

ENABLING OBJECTIVES

1. Demonstrate safe working practices
2. Demonstrate correct use of hand tools, drill, and taps.
3. Identify personal protective equipment.

RESOURCE

Johnson. **General Industrial Machine Shop**, 3d ed.

TEACHING ACTIVITIES

1. Demonstrate correct use of center punch.
2. Explain the difference between the screw extractor and reamer.
3. Explain the importance of selecting the correct drill and screw extractor.
4. Emphasize the need for accurate drilling.
5. Demonstrate how to perform screw extraction.

PERFORMANCE OBJECTIVE 51

CRITERION-REFERENCED MEASURE

Questions

1. Screw extractors are _____.
 - a. straight.
 - b. tapered.
2. Screw extractors are made of soft metal. True or False?
3. A lead hole should always be drilled in a damaged screw. True or False?

Answers

1. a.
2. False
3. True

Practical Application

Have student remove damaged screws and other threaded hardware.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 51 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 51
REMOVE DAMAGED SCREWS AND OTHER THREADED HARDWARE

Student's Name _____ **Date** _____

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Locked out equipment power.		
2. Selected drill.		
3. Center punched damaged screw or other threaded fastener. NOTE: Annealed/normalized if necessary.		
4. Drilled hole in center of damaged fastener.		
5. Placed screw extractor in hole.		
6. Removed damaged screw/fastener.		
7. Cleaned out hole.		
8. Inspected threads for burrs and damage.		
9. Retapped if necessary.		
10. Cleaned up.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____ **Date** _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 52

TASK

Tighten loose furniture component.

STANDARD OF PERFORMANCE OF TASK

Repaired furniture must be firm; it cannot wobble; there can be no measurable space in joints; there can be no substance protruding from joints.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Furniture with loose components
Regular screwdriver
Phillips screwdriver
Wood glue
Stripped piece of plastic wood for shims
C clamps

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. List tools and materials needed to make necessary repairs.
3. Explain workmanship standards.

RESOURCES

1. Lander. **Home Repair and Maintenance.**
2. Woodin and Hayes. **Home and Building Maintenance.**

TEACHING ACTIVITIES

1. Acquire handouts from furniture repairer on repairing furniture . Put information together in handout for student.
2. Prepare furniture for student to find loose furniture parts and determine proper repairing.
3. Demonstrate to student how to determine what components are loose and the necessary procedures to tighten loose furniture parts.
4. Review procedures explained and demonstrated, and allow student to go through procedure for tightening loose furniture components.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 52

CRITERION-REFERENCED MEASURE

Questions

1. To repair broken or deteriorated area of furniture, _____ or _____ must be used.
2. If screw hole is stripped, larger screws must be used. True or False?
3. Component must be completely removed from its socket or separated if it is a corner. True or False?

Answers

1. Plastic Wood, shims
2. False
3. True

Practical Application

Have student tighten loose furniture components.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 52 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 52

TIGHTEN LOOSE FURNITURE COMPONENTS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Carried furniture to shop area, if possible.		
2. Collected tools and materials.		
3. Removed component completely from its socket or separated component if it was a corner, if possible.		
4. Used Plastic Wood or shims to repair broken or deteriorated areas.		
5. If screw holes were stripped, a. made new hole, if possible. b. drilled out old hole; measured depth of hole. c. cut dowel rod to fit old hole and covered with glue. d. drove dowel rod into place, taking care to see that tip of dowel rod did not protrude beyond edge of component.		
6. Reassembled furniture and returned to use.		
7. Cleaned tools and area.		
8. Returned tools to storage place.		
9. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 53

TASK

Spot paint.

STANDARD OF PERFORMANCE OF TASK

There must be no runs in painted surface; spot must be feathered into old paint so that there is no noticeable division.

SOURCE OF STANDARD

Brainard. *Handbook for School Custodians*, pp. 85, 145-253.

CONDITIONS FOR PERFORMANCE OF TASK

Soiled spot on painted surface
Paintbrushes
Clean rags
Sandpaper

Drop cloth/old paper
Paint scrapper
Paint thinner
Paint

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Describe conditions that must be corrected before painting begins.
3. Explain worker's standards.

RESOURCE

Sach. *A Complete Guide to Building and Plant Maintenance*, 2d ed.

TEACHING ACTIVITIES

1. Assign reading material in class text and prepare handout on procedure for spot painting.
2. List on the blackboard material and tools required for spot painting. Note the proper procedure for finding and mixing paints to match existing paint.
3. Prepare painted section of material with spot to be repainted; use procedure explained in class.
4. Demonstrate the methods for preparing a surface to be painted, and demonstrate how to mix paints to match existing color.
5. Review lesson and summation of procedures for spot painting; then allow student to begin preparing surfaces to be painted--matching colors and spot painting.

PERFORMANCE OBJECTIVE 53

CRITERION-REFERENCED MEASURE

Questions

1. Steel wool is used in preparing area to be painted. True or False?
2. What is used to protect floor from paint waste?
3. Soiled rags and cloths are to be saved for next paint job. True or False?

Answers

1. True
2. Drop cloth/old paper
3. False

Practical Application

Have student spot paint soiled surface.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 53 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 53

SPOT PAINT

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Selected matching paint and mixed to desired consistency.		
2. Collected tools and materials.		
3. Spread drop cloth or papers at spot.		
4. Scraped the surface and sanded it or polished it with steel wool to prepare it for painting, if necessary.		
5. Wiped surface with clean, lint-free cloth.		
6. Spread paint from bottom up; feather blended into old paint.		
7. Resealed paint can and wiped clean.		
8. Cleaned all drops of paint from floor and surrounding area thoroughly.		
9. Disposed of paint-soiled rags and cloths.		
10. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 54

TASK

Free sticking doors.

STANDARD OF PERFORMANCE OF TASK

Repair door so that it opens and closes freely.

SOURCE OF STANDARD

West Virginia Writing Team
Brainard. *Handbook for School Custodians*, pp. 271-82.

CONDITIONS FOR PERFORMANCE OF TASK

Standard door that sticks when opened or closed
Large Phillips or straight screwdriver
Shims
Planer

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Demonstrate procedure for using planer when needed.

RESOURCES

1. Gladstone. *The Simon and Schuster Complete Guide to Home Repair and Maintenance*.
2. Popular Mechanics. *Do-It-Yourself Encyclopedia*.

TEACHING ACTIVITIES

1. Discuss procedure for checking door to see where problem is located.
2. Cover steps for taking door off hinges and set up door so that demonstration can be performed for student.
3. Demonstrate how to measure material for cutting shims and planing door, if needed.
4. Explain and demonstrate the procedure for correcting sticking areas; determining where shims go and determining where to plane, if needed.
5. Review materials covered and steps explained and then allow student to check door for problem, remove door from hinges, correct problem, and hang door back on hinges.

PERFORMANCE OBJECTIVE 54

CRITERION-REFERENCED MEASURE

Questions

1. What two tools are used to remove rough or bulged areas on wood?
2. To remove door from hinges you must take out the _____.
3. One method used to free sticking is to use _____.
 - a. wood
 - b. shims
 - c. hinges
 - d. large screws

Answers

1. Wood file and planer
2. dowel pin
3. b.

Practical Application

Have student free sticking doors.

Method of Evaluating Practical Application

- Use Checklist for Performance Objective 54 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 54

FREE STICKING DOORS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Collected tools.		
2. Opened and shut door to determine where it was sticking.		
3. Checked and oiled hinges.		
4. Checked adjustment on hydraulic door closely and adjusted if there was a need.		
5. Filed or planed off if there was a bulge of wood.		
6. Waxed door edge.		
7. Lifted hinge pins and removed door, if it was stuck at bottom, by dragging on floor.		
8. Checked hinges to see if they were loose.		
9. Repaired hinges, if needed, by a. installing shim. b. installing dowel pin.		
10. Filed or planed bottom of door so that it cleared floor.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 55

TASK

Ease sticking drawers.

STANDARD OF PERFORMANCE OF TASK

Drawer must be level with rest of furniture piece; it must open and close with ease.

SOURCE OF STANDARD

West Virginia Writing Team
Brainard. *Handbook for School Custodians*, pp. 271-82.

CONDITIONS FOR PERFORMANCE OF TASK

Furniture with sticking drawers
Hammer
Candle wax
Thumbtacks
Flat-head screwdriver

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Safely use hand tools.

RESOURCE

Lander. *Home Repair & Maintenance*, pp. 128-29.

TEACHING ACTIVITIES

1. Assign student to read resource material.
2. Make necessary adjustments in order for drawer to slide in and out with ease.
3. Demonstrate application of candle wax with drawers that have wood tracks.
4. Show how to build up worn wood tracks with thumbtacks.

PERFORMANCE OBJECTIVE 55

CRITERION-REFERENCED MEASURE

Questions

1. Most sticking drawers are usually caused by friction. True or False?
2. Drawers with wood tracks can be renewed with _____.
3. Worn wood tracks of drawers can be built up with _____.
 - a. glue
 - b. wood strips
 - c. thumbtacks

Answers

1. True
2. candle wax
3. c.

Practical Application

Have student ease sticking drawers.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 55 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 55

EASE STICKING DRAWERS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Gathered tools and equipment.		
2. Freed drawer by pulling out firmly.		
3. Checked interior drawer carrier frame for loose places and tightened when drawer was free.		
4. Checked for high places along sides and removed them when drawer carrier frame was secure.		
5. Checked drawer for high places and removed them.		
6. Replaced drawer in carrier and moved in and out.		
7. Waxed skid areas if drawer moved with ease.		
8. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 56

TASK

Disassemble and clean wet/dry vacuum.

STANDARD OF PERFORMANCE OF TASK

Parts must not show smudges when wiped with clean, light colored cloth; all soil stains must be removed; hose must dry within 12 hours; there can be no obstructions in air suction channels.

SOURCE OF STANDARD

Ohio Trade and Industrial Education Service. **Custodial Training**, pp. 141-50.

CONDITIONS FOR PERFORMANCE OF TASK

Soiled wet/dry vacuum
Phillips screwdriver
Flat blade screwdriver
Air tank with air
Cleaning cloth
Safety goggles

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Use hand tools and compressed air safely.

RESOURCE

Manufacturer's Manual.

TEACHING ACTIVITIES

1. Instruct student to disconnect the electrical cord from outlet.
2. Demonstrate how to remove hose, power head, and other attachments.
3. Show how to clean the vacuum with compressed air and a cloth.
4. Put back vacuum cover head, any attachments, and the hose.

PERFORMANCE OBJECTIVE 56

CRITERION-REFERENCED MEASURE

Questions

1. Safety goggles are not needed when using compressed air. True or False?
2. _____ should be removed from the hose and the air suction channels.
3. To clean the tank and hose, _____ should be used.
 - a. gasoline
 - b. Varsol
 - c. vinegar water

Answers

1. False
2. Obstructions
3. c.

Practical Application

Have student disassemble and clean wet/dry vacuum.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 56 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 56

DISASSEMBLE AND CLEAN WET/DRY VACUUM

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Disconnected, washed, and wiped electric cord.		
2. Disconnected hose, wand, squeegee head, and other attachments.		
3. Cleared wand, hose, and attachments of obstructions.		
4. Washed and rinsed thoroughly; flushed with vinegar water.		
5. Removed vacuum head from tank (motor housing).		
6. Scrubbed inside of vacuum hood thoroughly.		
7. Took care to thoroughly cleanse high water cut-off; rinsed thoroughly; flushed with vinegar water.		
8. Flushed tank and scrubbed inside thoroughly.		
9. Wiped vacuum seal thoroughly.		
10. Cleaned and "lightly" oiled wheels, when required.		
11. Returned vacuum to resting place and put components in designated places.		
12. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 57

TASK

Disassemble and clean buffing machine.

STANDARD OF PERFORMANCE OF TASK

Buffing machine must be scrubbed and wiped clean so that when a light colored cloth is wiped over it, there is no dirt smudge on any component; all nuts and bolts must be tightened enough so that vibration does not work them loose.

SOURCE OF STANDARD

Ohio Trade and Industrial Education Service. **Custodial Training**, pp. 141-50.

CONDITIONS FOR PERFORMANCE OF TASK

Soiled buffing machine
Phillips screwdriver
Air tank with air
Adjustable wrench
Safety goggles

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Use hand tools and compressed air safely.

RESOURCE

Manufacturer's Manual.

TEACHING ACTIVITIES

1. Instruct student to disconnect the electrical cord from outlet.
2. Demonstrate how to disassemble and clean buffing machine.
3. Show how to reassemble the buffing machine.

PERFORMANCE OBJECTIVE 57

CRITERION-REFERENCED MEASURE

Questions

1. In order to remove the cleaning block, twist it
 - a. clockwise.
 - b. counterclockwise.
2. Mix _____ with water to make a cleaning solution.
3. The build-up from the block housing should be scraped both inside and out. True or False?

Answers

1. a.
2. vinegar
3. True

Practical Application

Have student disassemble and clean buffing machine.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 57 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 57
DISASSEMBLE AND CLEAN BUFFING MACHINE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Made cleaning solutions.		
2. Disconnected cord.		
3. Removed nylon (or buff) pads.		
4. Removed cleaning block; twisted counter-clockwise.		
5. Washed nylon pads in detergent; sling dried and rinsed in vinegar solution; sling dried and hung up; scrubbed block and rinsed.		
6. Scraped build-up from block housing inside and out.		
7. Scrubbed block housing inside and out with detergent and wire brush.		
8. Rinsed and flushed with vinegar solution.		
9. Tightened loose nuts and bolts.		
10. Washed and rinsed cord. Flushed with vinegar water.		
11. Washed handle and wheels; rinsed and flushed with vinegar.		
12. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR
AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 58

TASK

Replace butt hinge.

STANDARD OF PERFORMANCE OF TASK

When door is replaced, there must be 1/16" clearance between door edge and facing; door cannot wobble.

SOURCE OF STANDARD

Building Repairer V-TECS Guide.

CONDITIONS FOR PERFORMANCE OF TASK

Screwdriver
Prick punch
Claw hammer

ENABLING OBJECTIVES

1. Explain worker's standards.
2. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction**, p. 648.

TEACHING ACTIVITIES

1. Assign related reading units to the student from the class text and supplement these with copies of instructional materials taken from packaged hinge units. Have student prepare for participation in a blackboard presentation and group discussion. Have student note the size, type, and placement of hinges on doors in his/her home and how the units are secured.
2. Outline on the blackboard general information applicable to butt hinges and emphasize the replacement of butt hinges on a door.
3. Remove the butt hinge from a door in the immediate area and demonstrate how improper installation of hinges can cause poor door alignment and result in binding and sticking.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 58

CRITERION-REFERENCED MEASURE

Questions

1. An alternative to using screws to secure hinges is using ring shank nails. True or False?
2. The first step for removing a hinge from a door is to remove the hinge pin. True or False?
3. Quick set concrete should be used to fill old screw holes. True or False?
4. To secure proper alignment, drop pin into second half before securing second hinge half to door. True or False?

Answers

1. False
2. True
3. False
4. True

Practical Application

Have student replace butt hinge.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 58 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 58

REPLACE BUTT HINGE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed hinge pin.		
2. Removed screws from hinge.		
3. Plugged or refilled screw holes.		
4. Removed pin from new hinge.		
5. Placed new hinge half (leaf) in position.		
6. Installed screws.		
7. Repeated with second half of hinge.		
8. Installed pin.		
9. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 59

TASK

Replace acoustical tile.

STANDARD OF PERFORMANCE OF TASK

All replacement tile must be nailed, clipped, or stuck in place with proper adhesive, depending on ceiling structure; all work must be accurate and true to plane and line; all special fittings around pipes, sleeves, and fixtures must fit snugly; all glued tiles must adhere tightly to the backing material.

SOURCE OF STANDARD

Building Repairer V-TECS Guide.

CONDITIONS FOR PERFORMANCE OF TASK

Utility knife
Rule or tape measure
Square or straight edge
Glue brush
Hot glue
Hot glue gun

ENABLING OBJECTIVES

1. Explain worker's standards.
2. Demonstrate safe work practices.

RESOURCE

Naval Training Command. **Builder Inc., Rate Training Manual.**

TEACHING ACTIVITIES

1. Assign related reading materials. Also, have student observe areas in the school and at home that have acoustical tile represented as a building material.
2. Outline on the blackboard relevant information that includes the kind of material that acoustical tiles are made of and the working properties and general characteristics of the material.
3. Demonstrate the replacement of ceiling tile using a prepared surface such as a plywood panel to represent a ceiling area. Guide the student through a practice session.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 59

CRITERION-REFERENCED MEASURE

Questions

1. To replace a tile, both tongues must be removed from two edges of the replacement tile. True or False?
2. To insert the replacement tile, the upper side of the groove must be removed on one edge of the replacement tile. True or False?
3. One edge of the replacement tile containing the groove should be slipped over the tongue of the existing tile at a slight angle, and the replacement tile is then pushed into place. True or False?
4. From the hot glue gun, deposit glue the size of a quarter on each corner on the top side
 - a. before inserting the replacement tile.
 - b. after inserting the replacement tile.

Answers

1. True
2. True
3. True
4. a.

Practical Application

Have student replace acoustical tile.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 59 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 59

REPLACE ACOUSTICAL TILE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Shaved tongue on replacement tile on two edges and upper side of one edge of groove.		
2. Placed tile in opening.		
3. Used hot glue to pin new tile to existing tiles.		
4. Embedded head of nails slightly below surface of tile. NOTE: Tiles on smooth surfaces may be replaced by cutting tongue from two edges and dabbing spots of glue in center and all four corners.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 60

TASK

Remove paint by using scraper/paint remover.

STANDARD OF PERFORMANCE OF TASK

All paint must be removed from surface; there can be no cuts or grooves in the surface.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Stiff brush
Steel wool
Scraper
Bucket
Rags/sponges

Wire brush
Eye protection
Putty knife
Power sander
Paint remover

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Explain worker's standards.

RESOURCE

Naval Training Command. **Builder Inc., Rate Training Manual.**

TEACHING ACTIVITIES

1. Supplement reading assignment in the class text with handout literature obtained from local paint store outlets.
2. Outline on the blackboard the procedure to follow for scraping paint from a given surface. Note the applications of a wire brush, putty knife, scraper, and sanding materials. Point out the need to wear goggles for eye protection.
3. Demonstrate the removal of loose paint with a putty knife and a wire brush.
4. Demonstrate the complete removal of paint from a surface using paint remover.
5. Discuss the safety precautions that should be taken when working with paint remover.

PERFORMANCE OBJECTIVE 60

CRITERION-REFERENCED MEASURE

Questions

1. Goggles or eye protection are not necessary when scraping or brushing loose paint from a surface. True or False?
2. Paint remover is a _____ liquid.
 - a. noncombustible
 - b. combustible
3. In stubborn areas where old paint is hard to remove, a _____ should be used.
 - a. scraper
 - b. putty knife
 - c. wire brush
 - d. sandpaper
4. When removing loose paint from a wall a(n) _____ should be placed on the floor.

Answers

1. False
2. b.
3. d.
4. drop cloth

Practical Application

Have student remove paint by using scraper/paint remover.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 60 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 60
REMOVE PAINT BY USING SCRAPER/PAINT REMOVER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
A. SCRAPER		
1. Removed loose paint with putty knife and wire brush. NOTE: Was careful not to cut or erode surface.		
2. Sanded stubborn parts.		
3. Used fine sandpaper to feather edges.		
4. Brushed away all dust, dirt, and debris.		
B. PAINT REMOVER		
1. Covered all surfaces which may have been damaged by paint remover.		
2. Applied even coat of paint remover to small area. CAUTION: Protected eyes and skin from paint remover. Used a well ventilated area.		
3. Allowed paint remover time to loosen paint.		
4. Removed loose paint and applied second coat.		
5. Washed surface with detergent water and rinsed with clear water.		
6. Continued Items 2 - 5 until job was finished.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 61

TASK

Remove and replace door lock set.

STANDARD OF PERFORMANCE OF TASK

Door must lock and unlock without hesitation.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Phillips screwdriver
Blade-type screwdriver

ENABLING OBJECTIVES

1. Describe conditions that may justify the replacement of a door lock set.
2. Explain worker's standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Wagner. **Modern Carpentry**, pp. 431-32.

TEACHING ACTIVITIES

1. Assign related reading units and have student observe and list the kinds of lock sets represented in his/her neighborhood--home, school, church, etc., noting the basic parts that are shared in common by all lock set units and comparing interior and exterior unit-locking devices.
2. Acquire a lock set and have student read the instructions and assemble and disassemble the unit. List on the blackboard the parts of the unit and the function of each part.
3. Demonstrate adjustments which are often required when installing a lock set.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 61

CRITERION-REFERENCED MEASURE

Questions

1. All door lock sets are the same and manufacturer's instructions are not needed. True or False?
2. The holding striker is placed
 - a. on the door jamb.
 - b. in the edge of the door.
3. The striker plate is placed
 - a. on the door jamb.
 - b. in the edge of the door.
4. What part of the door lock set is located on the inside and outside of the door?

Answers

1. False
2. b.
3. a.
4. knob

Practical Application

Have student remove and replace door lock set.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 61 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 61

REMOVE AND REPLACE DOOR LOCK SET

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed knob on inside.		
2. Removed rosette.		
3. Removed screws holding cylinder and knob.		
4. Removed screws holding striker in edge of door.		
5. Removed cylinder and outside knob.		
6. Removed striker.		
7. Reset new striker.		
8. Reset new cylinder and outside knob.		
9. Tightened screws holding striker in edge of door.		
10. Replaced screw holding cylinder and knob.		
11. Replaced rosette.		
12. Replaced inside knob.		
13. Cleaned up.		
14. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 62

TASK

Rebuild stair step.

STANDARD OF PERFORMANCE OF TASK

Tread and riser must be the same dimensions as old tread and riser; repaired step must be plumb and level.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Hand/power saw
Framing square
Claw hammer
Rule or tape measure
Crowbar

ENABLING OBJECTIVES

1. Explain worker's standards.
2. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Wagner. **Modern Carpentry**, pp. 406-7.

TEACHING ACTIVITIES

1. Assign reading materials from the class text and have student observe steps in the community and at home to identify conditions related to the need for step repairs.
2. Illustrate on the blackboard the parts of a stair system and explain the function of each part.
3. Demonstrate the layout, cutting, and assembly of a stair unit consisting of two riser and two tread units.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 62

CRITERION-REFERENCED MEASURE

Questions

1. Stairs are basically sets of _____ and _____ supported by _____.
2. The front edge of the tread that overhangs the riser is called the _____.
3. The riser height of service stairs should not exceed _____.
4. The minimum head room for a main stairway as specified by FHA is 7'6". True or False?

Answers

1. treads, risers, stringers
2. nosing
3. 8"
4. False

Practical Application

Have student rebuild stair step.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 62 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 62

REBUILD STAIR STEP

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed old stair treads and risers.		
2. Removed old nails.		
3. Examined stringer for decay.		
4. Patched stringer.		
5. Measured and cut new tread.		
6. Measured and cut new riser.		
7. Nailed new piece to stair stringer.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR
AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 63

TASK

Realign door.

STANDARD OF PERFORMANCE OF TASK

A 4d finish nail or 1/16" piece of cardboard must slide around the door when it is in a closed position; all hinges must fit tightly; door must fit door frame so that there is an ease of opening and shutting.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Smooth plane
Screwdriver
Wood plugs/country match sticks

ENABLING OBJECTIVES

1. Explain worker's standards.
2. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Wagner. **Modern Carpentry**, p. 427.

TEACHING ACTIVITIES

1. Assign reading units in the class text and indicate the need to know the parts and functions of all factors that relate to a door unit--the door, the door frame, and the hardware.
2. Outline on the blackboard the parts and the functions of all parts of a door unit and illustrate factors that might contribute to poor alignment.
3. Select a door in the immediate area and loosen up the screws holding the top hinge in the door jamb. Demonstrate how this condition affects the door alignment by opening and shutting the door, noting the binding that occurs as the door rubs the jamb.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 63

CRITERION-REFERENCED MEASURE

Questions

1. Most doors will eventually have to be realigned. True or False?
2. Hinge _____ may work loose from the door jamb, thus affecting door alignment.
3. Hinge _____ may ride up out of their housing just enough to affect proper door alignment.
4. The edge of the door may have to be _____ if it has expanded from moisture.

Answers

1. True
2. screws
3. pins
4. planed

Practical Application

Have student realign door.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 63 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 63

REALIGN DOOR

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Closed door and slid a 4d finish nail around edge.		
2. Checked hinges to see if they were loose.		
3. Tightened screws or reset hinges. NOTE: It is usually possible to place a wedge under the door, thereby repositioning it and holding it up while hinge is reseated.		
4. Planed edge of door.		
5. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS

PERFORMANCE OBJECTIVE 64

TASK

Prepare surface for wallpaper.

STANDARD OF PERFORMANCE OF TASK

When the finished area is wiped with a clean white cloth, there can be no soiled area or discoloration; the cloth must pass smoothly over the surface without hanging up; when the wall is papered, there can be no high or low places or other distortions from a poorly prepared surface.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Wide putty knife
Scraper
Cloths/sponges
Sandpaper
Pail
Detergent

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when preparing surface for wallpaper.
2. Describe conditions that must be corrected before applying wallpaper.
3. List tools and materials required for preparing a surface to receive wallpaper.
4. Outline the procedure for preparing a surface that is to be wallpapered.
5. Explain worker's standards.
6. Demonstrate safe work practices.

RESOURCE

Naval Training Command. **Builder Inc., Rate Training Manual.**

PERFORMANCE OBJECTIVE 64

TEACHING ACTIVITIES

1. Assign reading activities that relate to wallpapering, generally with emphasis on surface preparation.
2. Outline on the blackboard the essentials of wallpaper hanging and illustrate the preparation of a surface that is to be wallpapered.
3. Demonstrate the cleaning of a mock-up wall surface that has been prepared to represent the many factors that must be corrected prior to hanging wallpaper.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

CRITERION-REFERENCED MEASURE

Questions

1. Cracks and holes do not have to be filled when they will be covered with wallpaper. True or False?
2. If cracks and holes are filled, then they must be _____ before they are finished and ready for wallpaper.
3. Walls should be wiped clean to remove all dust and dirt. True or False?
4. Sometimes it may be necessary to _____ the walls.
 - a. replace
 - b. remove
 - c. prime

Answers

1. False
2. sanded
3. True
4. prime

Practical Application

Have student prepare surface for wallpaper.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 64 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 64

PREPARE SURFACE FOR WALLPAPER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Removed all loose paper and scaling paint.		
2. Patched and filled all cracks or damaged places.		
3. Sanded, patched, and filled areas. NOTE: Enameled walls were sanded lightly.		
4. Cleaned walls to remove all dust and dirt.		
5. Allowed surface to dry thoroughly.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR
AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 65

TASK

Prepare new wood for painting.

STANDARD OF PERFORMANCE OF TASK

When first coat of paint is applied, there can be no high or low places;
there can be no discoloration showing through the paint.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Sandpaper
Dust brush/rags
Putty knife
Sanding block

ENABLING OBJECTIVES

1. Explain worker's standards.
2. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction**, pp. 1105-10.

TEACHING ACTIVITIES

1. Assign resource reading for class discussion.
2. Use the blackboard to list types and classifications of priming materials and compare the application and characteristics of each, illustrating sanding techniques and the filling of nail holes.
3. Demonstrate sanding the surface of wood, filling nail holes with wood putty or a similar filler, and applying a primer.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 65

CRITERION-REFERENCED MEASURE

Questions

1. Priming of new wood is not necessary. True or False?
2. Filling nail holes and sanding rough areas are necessities. True or False?
3. Wood should be cleaned of dust and soiled areas. True or False?

Answers

1. False
2. True
3. True

Practical Application

Have student prepare new wood for painting.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 65 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 65
PREPARE NEW WOOD FOR PAINTING

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Cleaned wood of dust, soiled areas, and dirt using sandpaper or new wood cleaner.		
2. Sanded rough edges and surfaces smooth.		
3. Filled nail holes.		
4. Applied coat of primer.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 66

TASK

Install resilient floor covering.

STANDARD OF PERFORMANCE OF TASK

Floor covering must be level; there can be no paste oozing from cracks; there can be no bubbles in floor.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Linoleum knife/hook blade knife	Square
Notched floor trowel	Straight edge
Putty knife	Floor roller
Chalk line	Rule/tape measure

ENABLING OBJECTIVES

1. Explain worker's standards.
2. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction**, pp. 818-25.

TEACHING ACTIVITIES

1. Present an outline of related information on the blackboard and guide a class discussion covering details of tools, materials, and work requirements.
2. Demonstrate the preparation of a surface and the installation of a resilient floor covering.
3. Present a review and summation of events using the blackboard.

PERFORMANCE OBJECTIVE 66

CRITERION-REFERENCED MEASURE

Questions

1. The floor should be cleaned and all cracks filled before installing paste.
True or False?
2. What mold should be removed before the paste is put on the floor?
 - a. Crown
 - b. Corner
 - c. Base shoe
3. When the floor covering has been placed on the floor and the buckles and wrinkles smoothed out, what should then be done to the floor covering?

Answers

1. True
2. c.
3. It should be rolled with a roller.

Practical Application

Have student install resilient floor covering.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 66 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 66

INSTALL RESILIENT FLOOR COVERING

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Cleaned floor.		
2. Filled all cracks or damaged areas.		
3. Measured area length and width at several places to determine widest area.		
4. Cut piece from roll.		
5. Removed base shoe mold.		
6. Placed sheet goods in room and fit. NOTE: All pieces must have fit contour of floor.		
7. Pasted floor.		
8. Rolled covering back into place and smoothed out all buckles and wrinkles.		
9. Repeated same procedure at other end, rolling or folding back to the previously glued area.		
10. Smoothed all wrinkles and buckles.		
11. Rolled floor with roller.		
12. Replaced base shoe molding.		
13. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS

PERFORMANCE OBJECTIVE 67

TASK

Install furring strips.

STANDARD OF PERFORMANCE OF TASK

When finished, furring strips must be square and equidistant; furring strips must be securely fastened to the structure so that they don't wobble.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Claw hammer
Hand/power saw
Level
Square
Chalk line

ENABLING OBJECTIVES

1. Explain worker's standards.
2. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction**, pp. 782-86, 669-71, and 752-58.

TEACHING ACTIVITIES

1. Assign reading activities from the class text and related school and community resources.
2. Present an outline of information related to furring strip installation using the blackboard to illustrate and explain details.
3. Demonstrate the use of furring strips.
4. Present a review and summation of events using the blackboard.

PERFORMANCE OBJECTIVE 67

CRITERION-REFERENCED MEASURE

Questions

1. Furring strips are installed along the floor. True or False?
2. Furring strips should be placed every _____ apart.
 - a. 12"
 - b. 16"
 - c. 24"
3. Furring strips should be plumbed from the floor and marked with a(n) _____.

Answers

1. False
2. b.
3. chalk line

Practical Application

Have student install furring strips.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 67 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 67

INSTALL FURRING STRIPS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Measured length of wall; cut and fastened furring strip to wall along floor. NOTE: Strips must have been plumb.		
2. Measured length of wall; cut and fastened furring strip against wall along ceiling. NOTE: Strips must have been plumb.		
3. Measured from floor up wall 16", deducted half width of furring strip, and marked well.		
4. Repeated Item 3 at opposite end of wall.		
5. Struck chalk line on wall between two points.		
6. Continued Item 3 from chalk line to ceiling.		
7. Fastened horizontal strips to wall.		
8. Cut and nailed furring strip against wall at corner. NOTE: Strips must have been plumb.		
9. Measured from intersecting wall or corner out 48" and deducted half the width of furring strip.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

CHECKLIST FOR PERFORMANCE OBJECTIVE 67

INSTALL FURRING STRIPS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
10. Plumbed line on wall and fastened strip.		
11. Continued layout of 48" along wall.		
12. Fastened furring strips.		
13. Performed all work in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 68

TASK

Install drop ceiling.

STANDARD OF PERFORMANCE OF TASK

Ceiling must have a smooth, even surface; all border tile and pieces which fit around objects must be fitted with no more than 1/8" gap between tile and object.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

4' level

Rule/tape measure

Claw hammer

Hacksaw

Tin snips

Chalk line

ENABLING OBJECTIVES

1. Describe a variety of conditions that would be appropriate for the installation of drop ceiling.
2. Explain worker's standards.
3. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction**, pp. 780-81, 790-99.

TEACHING ACTIVITIES

1. Supplement reading assignments in the class text with materials made available through school and community resources.
2. Acquire a sampling of essential parts of the ceiling system and have the student install a portion of a hanging ceiling in a prepared area.
3. Present a review and summation of events using the blackboard.

PERFORMANCE OBJECTIVE 68

CRITERION-REFERENCED MEASURE

Questions

1. Dropped ceiling must have a minimum clearance of _____ above the desired height of the ceiling.
 - a. 12"
 - b. 6"
 - c. 3"
2. The first mark for the dropped ceiling should be at one corner. True or False?
3. Supported main runners should be held by _____.

Answers

1. c.
2. True
3. wire hangers

Practical Application

Have student install drop ceiling.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 68 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 68

INSTALL DROP CEILING

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Checked room for obstructions.		
2. Marked desired height of ceiling at one corner.		
3. Leveled and struck line around perimeter of room and fastened wall angle. NOTE: There must have been a minimum clearance of 3".		
4. Calculated equal margin on each side and each end of room using desired pattern size.		
5. Measured and installed wire hangers.		
6. Marked off border width, cut main runner, and installed.		
7. Supported main runner by wire hangers; kept it level with wall angle.		
8. Began at center of room; installed cross T's.		
9. Laid ceiling tile in rack.		
10. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 69

TASK

Hang wallpaper.

STANDARD OF PERFORMANCE OF TASK

All wallpaper patterns must be uniform throughout; there can be no overlapping of patterns.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Utility knife
Plumb bob/level
Straight edge
Wide putty knife

Wallpaper
Brush
Rule

ENABLING OBJECTIVES

1. Point out differences in wall surfaces and necessary preparation before hanging paper.
2. Describe types, sizes, costs, and properties of different wallpaper products.
3. Explain worker's standards.
4. Demonstrate safe work practices.

RESOURCE

Naval Training Command. **Builder Inc., Rate Training Manual.**

TEACHING ACTIVITIES

1. Acquire handout literature from local wallpaper outlets to supplement materials made available through the school and community libraries.
2. Discuss the requirements for wallpapering activities, outline details on the blackboard, and discuss.
3. Complete the work sequence and guide student through the various steps with a practice session.

PERFORMANCE OBJECTIVE 69

CRITERION-REFERENCED MEASURE

Questions

1. Wallpaper should be installed on a smooth, clean wall. True or False?
2. Cut the wallpaper the exact length needed for the wall. True or False?
3. When the wallpaper is hung on the wall it then should be smoothed out with a _____
 - a. board
 - b. brush
 - c. trowel

Answers

1. True
2. False
3. b.

Practical Application

Have student hang wallpaper.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 69 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 69

HANG WALLPAPER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Plumbed line on wall.		
2. Cut length of wall covering; allowed a little extra for trimming at ceiling and floor.		
3. Pasted back of wallpaper.		
4. Folded bottom half about halfway.		
5. Hung top against wall using plumb line to keep plumb.		
6. Smoothed with brush.		
7. Unfolded and brushed out bottom half; kept plumb with line.		
8. Trimmed ends at ceiling and at floor.		
9. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 70

TASK

Hang drapes.

STANDARD OF PERFORMANCE OF TASK

Drapes must open and shut without hesitation; top and bottom of drapes must be level.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Electric drill and bits
Rule
Level

ENABLING OBJECTIVES

1. Explain the relevant safety precautions/procedures apparent when hanging drapes.
2. List the tools and materials required for hanging drapes.
3. Outline the work sequence for hanging drapes.
4. Identify areas where drapes might be desired or required.
5. Explain worker's standards.
6. Demonstrate safe work practices.

RESOURCE

Naval Training Command. Builder Inc., Rate Training Manual.

TEACHING ACTIVITIES

1. Acquire reading materials from sources which supply drapes and accessories.
2. Enlist student aid in setting up an announced demonstration.
3. Simulate a window area on a prepared wall surface, or, if practical, use a nearby window to demonstrate hanging drapes.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 70

CRITERION-REFERENCED MEASURE

Questions

1. Hanging drapes requires at least _____ support brackets.
 - a. two
 - b. three
 - c. four
2. Support brackets are usually installed on the _____ frame.
 - a. wall
 - b. window
 - c. door
3. Support brackets do not have to be at the same level. True or False?

Answers

1. b.
2. b.
3. False

Practical Application

Have student hang drapes.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 70 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 70

HANG DRAPES

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Located center of window and marked wall at desired height.		
2. Used center of window as reference point; measured out one half length of rod and marked both sides of window frame.		
3. Used a level or chalk line; trued rod support brackets and fastened to wall.		
4. Spaced and fastened remaining hangers or brackets to wall.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 71

TASK

Fill nail holes.

STANDARD OF PERFORMANCE OF TASK

Surface of hole must blend evenly and smoothly with rest of wood surface.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Hammer
Nail set
Sandpaper
Putty knife
Filler material

ENABLING OBJECTIVES

1. Identify conditions that would justify filling in nail holes.
2. Explain worker's standards.
3. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer. **Cabinetmaking and Millwork**, 5th ed., pp. 786-88.

TEACHING ACTIVITIES

1. Assign reading units in the class text and/or related materials from school and community resources.
2. Outline related information on the blackboard and encourage and guide a group discussion on finishing skills and the purpose of filling nail holes.
3. Acquire the basic tools and materials and demonstrate the use of the nail set and the application and dressing out of filler materials.

PERFORMANCE OBJECTIVE 71

CRITERION-REFERENCED MEASURE

Questions

1. Surface can be sanded once filler has been placed in hole. True or False?
2. List two tools required for filling nail holes.
3. What is used to set nails below wood surface?
 - a. Putty knife
 - b. 8d nail
 - c. Nail set
 - d. None of the above

Answers

1. False
2. Hammer and nail set
3. c.

Practical Application

Have student fill nail holes.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 71 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 71

FILL NAIL HOLES

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Chose correct size nail set.		
2. Set nail below surface of material.		
3. Filled hole by forcing filler into hole until slightly over full.		
4. Sanded filler smooth and leveled with surface of wood after filler had thoroughly dried or hardened.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 72

TASK

Cut molding using miter box.

STANDARD OF PERFORMANCE OF TASK

Finished pieces must fit closely on internal corners forming a straight, plumb surface or line; cut piece must not be splintered.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Miter box
Miter saw
Pencil
Rule/tape measure

ENABLING OBJECTIVES

1. Explain worker's standards.
2. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer. **Cabinetmaking and Millwork**, pp. 942-44.

TEACHING ACTIVITIES

1. Assign reading activities in the class text and/or related materials.
2. Demonstrate the use of the miter box by sawing given angles on selected pieces of material.
3. Make a coped joint, using the coping saw to back cut a miter joint which was sawed using the miter box, and indicate situations where such a joint is helpful or even required.
4. Engage student in hands-on activities with a practice session.

PERFORMANCE OBJECTIVE 72

CRITERION-REFERENCED MEASURE

Questions

1. What is used when measuring material is to be cut?
 - a. Pencil
 - b. Tape measure
 - c. Rule
 - d. b. and c.
2. What tools are used for making cuts on wood at certain angles?
3. Light, even strokes will prevent splintering. True or False?

Answers

1. d.
2. Miter box and miter saw
3. True

Practical Application

Have student cut molding using miter box.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 72 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 72

CUT MOLDING USING MITER BOX

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Measured length and marked top edge of material to be cut.		
2. Set miter saw at desired angle.		
3. Placed material in miter box. NOTE: Took care not to damage material in any way.		
4. Aligned saw tooth to mark and cut. NOTE: Used light, even strokes to prevent splintering.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 73

TASK

Cut sheet metal.

STANDARD OF PERFORMANCE OF TASK

All sheet metal cut must be exactly on layout lines.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Tin/aviation snips
Scratch awl
Square/straight edge
Rule/tape measure

ENABLING OBJECTIVES

1. Identify the various types of sheet metal and point out possible uses.
2. Explain worker's standards.
3. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Ludwig. **Metalwork, Technology and Practice**, pp. 233-57.

TEACHING ACTIVITIES

1. Acquire scrap pieces of sheet metal and have student practice cutting along specified layout lines.
2. Demonstrate the proper use of the aviation snips.
3. Present related material on the various types of sheet metal.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 73

CRITERION-REFERENCED MEASURE

Questions

1. Gloves are not required when working with tin or sheet metal. True or False?
2. What tool is used to mark lines on sheet metal?
3. When cutting sheet metal _____ or _____ are used to make the cuts.

Answers

1. False
2. Scratch awl
3. tin snips, aviation snips

Practical Application

Have student cut sheet metal.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 73 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 73

CUT SHEET METAL

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Placed sheet metal on table or other flat area.		
2. Measured and laid out desired pattern. CAUTION: Used hand and eye protection.		
3. Used scratch awl to mark line on metal.		
4. Cut along layout lines on metal.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR
AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 74

TASK

Remove broken bolt.

STANDARD OF PERFORMANCE OF TASK

There can be no damage to the threads in the bolt hole; all bits and pieces of meal must be removed from bolt hole.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Electric drill	Screw extractor
Assortment of bits	Ball peen hammer
Center punch	Wrenches
Chuck key	Work-holding device
Tap wrench	

ENABLING OBJECTIVES

1. Identify factors that may account for bolts being broken off in their housing.
2. Explain worker's standards.
3. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. McCarthy. **Machine Tool Technology**, 3d ed., pp. 120-22.

TEACHING ACTIVITIES

1. Assign reading materials and point out the functions of screw extractors and allied tools.
2. List on the blackboard the tools required for removing a bolt using a screw extractor and discuss.
3. Acquire a screw extractor and other required tools and demonstrate the procedure for removing a broken bolt.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 74

CRITERION-REFERENCED MEASURE

Questions

1. What is one of the causes of bolts being broken when pressure is applied?
2. Drilling in metal at fast speeds will burn drill bits up. True or False?
3. What tool is used once the broken bolt is prepared?

Answers

1. Corrosion (Rust)
2. True
3. Screw extractor

Practical Application

Have student remove broken bolt.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 74 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 74

REMOVE BROKEN BOLT

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Secured workpiece in vise or work-holding device.		
2. Center punched the broken bolt.		
3. Drilled hole in center of broken bolt.		
4. Drove screw extractor (easy-out) into drilled hole.		
5. Removed broken bolt.		
6. Inspected the threads in the hole.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDINGS**

PERFORMANCE OBJECTIVE 75

TASK

Spot repair stucco.

STANDARD OF PERFORMANCE OF TASK

The repaired area must blend into the old area without swelling above the new surface or shrinking below the new surface; when dried, there can be no visible space (cracks) between the new stucco and the old.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Trowel
Cold chisel
Dusting brush
Sponge

ENABLING OBJECTIVES

1. Describe factors that contribute to the need for stucco repairs.
2. Explain worker's standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Feirer and Hutchings. **Carpentry and Building Construction**, pp. 696-98.

TEACHING ACTIVITIES

1. Direct student to read related materials in the class text.
2. Illustrate on the blackboard different materials and surfaces used for bonding stucco to desired units.
3. Acquire essential materials for a demonstration of spot repairing of stucco. Guide student in a practice session.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 75

CRITERION-REFERENCED MEASURE

Questions

1. Before first coat bonding, surface must be scratched first. True or False?
2. Stucco must be mixed and applied with a(n) _____.
3. New and old surfaces must be level and free of cracks. True or False?

Answers

1. True
2. trowel
3. True

Practical Application

Have student spot repair stucco.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 75 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 75

SPOT REPAIRING STUCCO

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Scaled area of loose pieces of stucco and brushed dirt and dust away.		
2. Mixed cement and sand.		
3. Added water and mixed.		
4. Moistened area where patch was to go.		
5. Applied mixture to damaged area.		
6. Worked down smooth with damp sponge.		
7. Scratched bonding surface on first coat.		
8. Applied additional coats until surfaces were equal.		
9. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

**USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR
THE PLUMBING AND WATER SYSTEMS**

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR THE
PLUMBING AND WATER SYSTEMS**

PERFORMANCE OBJECTIVE 76

TASK

Unclog drains.

STANDARD OF PERFORMANCE OF TASK

Water must flow unobstructed through the system. Components of trap must be reassembled and must not leak.

SOURCE OF STANDARD

Brainard. *Handbook for School Custodians*, pp. 73-130.

CONDITIONS FOR PERFORMANCE OF TASK

Clogged drain
Flat jaw pipe wrench

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Safely use hand tools.

RESOURCES

1. Lander. *Home Repair and Maintenance*, pp. 232-35.
2. Blankenbaker. *Modern Plumbing*, 3d ed., p. 232.

TEACHING ACTIVITIES

1. Assign student to read resource material.
2. Demonstrate how to remove a trap and clean it.
3. Make sure soft ring-type gaskets are in place before tightening the nuts.

PERFORMANCE OBJECTIVE 76

CRITERION-REFERENCED MEASURE

Questions

1. Water in a drain is moved by gravity force. True or False?
2. Any _____ run will have a slight slope toward the main stack.
3. Traps hold _____ to form a seal against sewer gas entering the house.
 - a. sand
 - b. water
 - c. air

Answers

1. True
2. horizontal
3. b.

Practical Application

Have student unclog drains.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 76 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 76

UNCLOG DRAINS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Moved tools and equipment to work site.		
2. Applied cleaner to clogged drain. NOTE: Drain cleaners are harmful if swallowed or splashed on skin or in eyes.		
3. Applied force cup.		
4. Disassembled trap and cleaned if drain was still not free; placed bucket under trap.		
5. Reassembled trap and ran water to plug hole. If water flowed to plug hole, replaced plug. If water still did not flow, called plumber.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR THE
PLUMBING AND WATER SYSTEMS**

PERFORMANCE OBJECTIVE 77

TASK

Thaw frozen water pipes.

STANDARD OF PERFORMANCE OF TASK

All faucets, commodes, and urinals must flow normal stream when opened.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Frozen water pipe
Heat tape
Trouble light
Warm air heat gun
Safety goggles

ENABLING OBJECTIVES

Demonstrate safe work practices.

RESOURCES

1. Lander. *Home Repair & Maintenance*.
2. Blankenbaker. *Modern Plumbing*, p. 229.

TEACHING ACTIVITIES

1. Demonstrate how to install heat tape.
2. Show where trouble light should be placed.
3. Instruct student how to use a warm air heat gun.

PERFORMANCE OBJECTIVE 77

CRITERION-REFERENCED MEASURE

Questions

1. Frozen water pipes should be thawed with a flame. True or False?
2. Frozen water pipes are very easy to thaw. True or False?
3. Pipes should be _____ to keep them from freezing.
 - a. exposed
 - b. painted
 - c. insulated

Answers

1. False
2. False
3. c.

Practical Application

Have student thaw frozen water pipes.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 77 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 77

THAW FROZEN WATER PIPES

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Gathered tools and equipment.		
2. Opened faucet nearest suspected frozen area.		
3. Determined what method to use--heat tape or light bulb.		
4. Fastened heat tape by wrapping frozen pipe.		
5. Placed trouble light so that cage covering bulb was touching pipe. CAUTION: When using hood to confine heat to frozen area, did not use a flammable material. Left 6-8 inches between bulb and hood.		
6. Insulated area that froze by digging dirt from frozen area and packing with sawdust or some like material. Wrapped to insulate or closed off draft area where pipe was exposed to draft.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR THE
PLUMBING AND WATER SYSTEMS**

PERFORMANCE OBJECTIVE 78

TASK

Replace faucet components.

STANDARD OF PERFORMANCE OF TASK

Handles must point at equal angles when in off position; water must flow and cease to flow in steady, even rhythm; water must not drip from faucet; there must be no leaks around component parts.

SOURCES OF STANDARD

West Virginia Writing Team
Brainard. *Handbook for School Custodians*, pp. 271-82.

CONDITIONS FOR PERFORMANCE OF TASK

Leaking faucet
Phillips screwdriver
Flat blade screwdriver
Adjustable wrench
Safety goggles

ENABLING OBJECTIVE

Demonstrate safe work practices.

RESOURCES

1. Lander. *Home Repair and Maintenance*, pp. 224-25.
2. Blankenbaker. *Modern Plumbing*, pp. 60-70.

TEACHING ACTIVITIES

1. Instruct student to remove faucet components.
2. Show how to remove and replace a new washer.
3. Demonstrate how to put faucet components back together.

PERFORMANCE OBJECTIVE 78

CRITERION-REFERENCED MEASURE

Questions

1. A faucet that is dripping indicates a worn washer or seat or both. True or False?
2. The water supply does not need to be turned off to repair a dripping faucet. True or False?
3. The first thing to be removed from a faucet is the _____.
 - a. washer
 - b. handle

Answers

1. True
2. False
3. handle

Practical Application

Have student replace faucet components.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 78 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 78

REPLACE FAUCET COMPONENTS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Gathered tools and equipment and carried them to work site.		
2. Shut off water to fixture.		
3. Removed handle. Loosened screw in top of handle and carefully lifted or pried handle from serrated stem. Put vaseline on serrated stem and into place in handle where stem fit.		
4. Unscrewed lock nut.		
5. Unscrewed stem or spindle from faucet. Replaced stem or spindle, if damaged.		
6. Removed brass screw at end of spindle and removed washer.		
7. Replaced other worn washers.		
8. Selected new washer (same type and size) and installed flat side toward bolt head.		
9. Reassembled.		
10. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR THE
PLUMBING AND WATER SYSTEMS**

PERFORMANCE OBJECTIVE 79

TASK

Cut plastic pipe.

STANDARD OF PERFORMANCE OF TASK

Cut ends must be true; cut pipe must be clear of burrs.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Hacksaw
Folding rule
Vise

ENABLING OBJECTIVES

1. Identify the various types of plastic pipe and point out their uses.
2. Explain worker's standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. *Builder Inc., Rate Training Manual*.
2. Blankenbaker. *Modern Plumbing*, pp. 128-33.

TEACHING ACTIVITIES

1. Acquire scrap pieces of plastic pipe and have student practice cutting it to a specified length by the instructor.
2. Demonstrate step-by-step procedures for cutting plastic pipe.
3. Describe the proper hacksaw blade used for cutting plastic pipe and the correct method of placing the blade in the hacksaw.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 79

CRITERION-REFERENCED MEASURE

Questions

1. The hacksaw is used to cut plastic pipe. True or False?
2. Plastic pipe must be free of _____ after cutting.
3. What is the first step for cutting plastic pipe?

Answers

1. True
2. burrs
3. Measure and mark the length to be cut.

Practical Application

Have student cut plastic pipe.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 79 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 79**CUT PLASTIC PIPE**

Student's Name**Date****DIRECTIONS TO STUDENT**

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Measured and marked length to be cut.		
2. Placed stick in vise.		
3. Placed hacksaw on mark and cut.		
4. Reamed cut edge.		
5. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature**Date**

DUTY **USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR THE PLUMBING AND WATER SYSTEMS**

PERFORMANCE OBJECTIVE 80

TASK

Cut metal tubing.

STANDARD OF PERFORMANCE OF TASK

Cut length must be within 1/16" of designated length; cut tubing must be free of burrs; tube end cannot be out of round.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Tube cutter
Hacksaw
Folding rule
Vise/Other holding device
File

ENABLING OBJECTIVES

1. Describe metal tubing and its various uses.
2. Explain worker's standards.
3. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Blankenbaker. **Modern Plumbing**, pp. 133-41.

TEACHING ACTIVITIES

1. Discuss with class how metal tubing of various types is used in confined areas.
2. Demonstrate the proper use of the tubing cutter.
3. Discuss standards of good workmanship.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 80

CRITERION-REFERENCED MEASURE

Questions

1. Tubing of various types is often used in confined areas. True or False?
2. List two tools used for cutting metal tubing.
3. Metal tubing can be found in _____.
 - a. refrigerators
 - b. automobiles
 - c. dryers
 - d. a. and b.

Answers

1. True
2. Hacksaw and tubing cutter
3. d.

Practical Application

Have student cut metal tubing.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 80 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 80

CUT METAL TUBING

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Measured and marked length to be cut.		
2. Placed tube cutter wheel on mark where tubing was to be cut.		
3. Tightened blade against tubing.		
4. Rotated blade around the tube until cutter rolled free.		
5. Tightened and rolled until tube was cut.		
6. Reamed cut ends to remove burrs. CAUTION: Wore hand and eye protection.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

**DUTY USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR THE
PLUMBING AND WATER SYSTEMS**

PERFORMANCE OBJECTIVE 81

TASK

Clear sewage using powered sewer auger.

STANDARD OF PERFORMANCE OF TASK

Sewage must flow without impediment.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Power auger
Hammer
Chisel
Shovel

Pick
Maddock
Lime

ENABLING OBJECTIVES

1. Point out the location of the clean outs in sewage system.
2. Explain worker's standards.
3. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Blankenbaker. **Modern Plumbing**, p. 232.

TEACHING ACTIVITIES

1. Present to the class related information that describes the functions of sewage systems.
2. List on the chalkboard and discuss the tools required for clearing sewage.
3. Demonstrate to the class appropriate safety procedures.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 81

CRITERION-REFERENCED MEASURE

Questions

1. Lime is used to cover affected area. True or False?
2. To be sure line is clear, repeatedly flush with _____.
 - a. drain cleaner
 - b. water
 - c. gas
 - d. none of the above
3. The most important tool for clearing a drain line is a(n) _____.

Answers

1. True
2. b.
3. power auger

Practical Application

Have student clear sewage using powered sewer auger.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 81 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 81
CLEAR SEWAGE USING POWERED SEWER AUGER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Located entry place.		
2. Broke sewage line. NOTE: Was prepared to bail effluvium until sewer line could be seen again if effluence was backed beyond breach hole.		
3. Inserted end of auger until blockage was reached.		
4. Bumped end of auger hard against blockage.		
5. Started power auger.		
6. Inserted pilot and extended to blockage.		
7. Retracted pilot.		
8. Tested sewer line.		
9. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 82

TASK

Remove and replace fuses.

STANDARD OF PERFORMANCE OF TASK

The fuse must be the specified amperage and must be securely installed according to the electrical code.

SOURCES OF STANDARD

Wisconsin Writing Team
Jansen. *Developing Troubleshooting Skills*, pp. 129-33.
Brumbaugh. *Heating, Ventilating and Air Conditioning*, Volume 2.

CONDITIONS FOR PERFORMANCE OF TASK

Electrical fuse box	Lock
Electrical code book	Electrical test equipment
Fuse puller	(continuity tester, voltmeter,
Replacement fuse strips	and volt-ohm meter)
Screwdrivers	Personal protective safety
	equipment

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Identify personal protective safety equipment.
3. Set up and use electrical test equipment.
4. Demonstrate correct use of hand tools such as wrenches and screwdrivers.

RESOURCES

1. *National Electrical Code*, 1975, pp. 70-71, Item C.
2. Miller. *Industrial and Residential Electricity*, 3d ed., pp. 1-17, 213, 216, 275-82, 286, and 373.

TEACHING ACTIVITIES

1. Identify electrical test equipment.
2. Use electrical test equipment to
 - a. demonstrate fuse is faulty.
 - b. check circuit for fault.
3. Discuss cause of fault.
4. Read resource material and identify the fuse rating.
5. Discuss the steps necessary to comply with code to select replacement.

PERFORMANCE OBJECTIVE 82

CRITERION-REFERENCED MEASURE

Questions

1. What is the best meter scale to use when checking a faulty fuse for continuity?
2. What tool is used to remove/replace a fuse?
3. When working with electrical circuits it is safe to work on energized equipment? True or False?

Answers

1. Any resistance scale that reads infinity can be used.
2. Fuse puller
3. False

Practical Application

Have student remove and replace fuses.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 82 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 82

REMOVE AND REPLACE FUSES

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Locked out equipment power source.		
2. Located faulty fuse with V.O.M.		
3. Removed faulty fuse using fuse puller.		
4. Connected lamp or continuity tester.		
5. Troubleshoot circuit until fault was determined.		
6. Corrected fault.		
7. Inspected circuit for cause of fault.		
8. Corrected cause of fault.		
9. Selected replacement fuse. a. Complete fuse, or b. Fuse strip, if replacement type.		
10. Installed new fuse in box.		
11. Unlocked/turned on power and tested operation.		
12. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 83

TASK

Replace faulty electrical cords and plugs.

STANDARD OF PERFORMANCE OF TASK

The cords and plugs will be of specified size(s), securely connected, insulated according to the electrical code, and will not arc or blow a fuse when plugged into specified circuit.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Machine/device with faulty
cord/plugs
Replacement cords and plugs
Continuity tester
Electrical code book

Mechanic's tool box (hand tools)
Personal safety equipment
Wire cutters
Wire strippers
Lock

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Set up and use electrical test equipment.
3. Demonstrate proper use of hand tools and wire strippers.

RESOURCES

1. **National Electric Code**, pp. 70-229, Item 400-3.
2. Miller. **Industrial and Residential Electricity**, 3d ed., pp. 300, 410-16.

TEACHING ACTIVITIES

1. Instruct student to identify electrical test equipment to be used.
2. Assign student to read resource material before replacing faulty components.
3. Assign student to replace faulty components with secure connections.
4. Assign student to provide proper insulating technique in accordance with the "equal-to" rule.
5. Assign student to show cause of fault using electrical test equipment.

PERFORMANCE OBJECTIVE 83

CRITERION-REFERENCED MEASURE

Questions

1. To identify faulty electrical cord a(n) _____ should be used.
 - a. V.O.M.
 - b. ground clamp
 - c. ampmeter
2. Why does a three wire cord have a ground wire?
3. What does "insulated according to the Electrical Code" mean?
4. What should be carefully avoided when plugging in electrical cords?

Answers

1. a.
2. For personal and equipment safety
3. "Equal to" or "better than" original insulation
4. Touching naked connectors

Practical Application

Have student replace faulty electrical cords and plugs.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 83 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 83
REPLACE FAULTY ELECTRICAL CORDS AND PLUGS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Turned off/locked out machine power.		
2. Inspected cord and plug for any cause of failure.		
3. Selected replacement cord and cut to length.		
4. Removed faulty cord(s) from machine/device.		
5. Removed plug from cord.		
6. Determined cause of faulty cord/plug.		
7. Corrected cause of fault.		
8. Installed plug on new cord.		
9. Installed new cord on machine/device.		
10. Tested for correct polarity with continuity tester.		
11. Plugged in machine/device.		
12. Unlocked/turned on power.		
13. Tested operation of machine/device.		
14. Performed all tasks in a safe manner.		

APPROVED: YES _____ NO _____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 84

TASK

Replace light switches.

STANDARD OF PERFORMANCE OF TASK

New switch must be installed properly and work.

SOURCE OF STANDARD

Kingsolver. *Custodial Trades, Electrical Equipment Maintenance for Building Custodians, Electrical Maintenance II*, pp. 1-42.

CONDITIONS FOR PERFORMANCE OF TASK

Defective light switch
Flat blade screwdriver
New light switch
Wire strippers
Needle nose pliers

ENABLING OBJECTIVES

1. Safely work with hand tools.
2. Demonstrate safe work practices.

RESOURCES

1. Lander. *Home Repair and Maintenance*, pp. 255-57.
2. Miller. *Industrial and Residential Electricity*, 3d ed., pp. 26-30.

TEACHING ACTIVITIES

1. Instruct student to turn off power to the switch.
2. Demonstrate how to remove faulty switch and replace with new switch.

PERFORMANCE OBJECTIVE 84

CRITERION-REFERENCED MEASURE

Questions

1. The power to a switch should be turned off . True or False?
2. The switch is always installed into the hot wire. True or False?
3. Loop of wires to be fastened to the switch should be turned _____.
 - a. clockwise
 - b. counterclockwise

Answers

1. True
2. True
3. a.

Practical Application

Have student replace light switches.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 84 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 84

REPLACE LIGHT SWITCHES

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Turned off power to switch and removed fuse controlling switch (where present). CAUTION: Tagged fuse box, indicating person working on electrical system.		
2. Removed cover plate screws.		
3. Removed screws holding switch to box.		
4. Pulled switch out of box.		
5. Loosened terminal screws and removed wires.		
6. Reattached new switch to same terminal wires. NOTE: Loop was clockwise.		
7. Pushed switch back into box and inserted screws to fasten switch to box.		
8. Replaced cover plate.		
9. Wiped entire area.		
10. Disposed of old switch.		
11. Replaced fuse and returned power.		
12. Checked to see if switch worked.		
13. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 85

TASK

Replace fluorescent bulb/tube.

STANDARD OF PERFORMANCE OF TASK

Light must turn on and off with switch.

SOURCE OF STANDARD

Kingsolver. *Custodial Trades, Electrical Equipment Maintenance for Building Custodians, Electrical Maintenance II.*

CONDITIONS FOR PERFORMANCE OF TASK

Defective fluorescent tube/bulb
New fluorescent tube/bulb
Ladder/scaffolding
Safety goggles

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Set up ladder or scaffolding.

RESOURCES

1. Kingsolver. *Custodial Trades, Electrical Equipment Maintenance for Building Custodians, Electrical Maintenance II.*
2. Miller. *Industrial and Residential Electricity*, 3d ed., pp. 367-75.

TEACHING ACTIVITIES

1. Instruct student to set up scaffolding and step ladder.
2. Demonstrate how to remove faulty bulb/tube and install new bulb/tube.

PERFORMANCE OBJECTIVE 85

CRITERION-REFERENCED MEASURE

Questions

1. A ladder should be held by an assistant. True or False?
2. Fluorescent bulbs/tubes will break very easily. True or False?
3. Safety goggles should be worn when changing fluorescent bulbs/tubes. True or False?

Answers

1. True
2. True
3. True

Practical Application

Have student replace fluorescent bulb/tube.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 85 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 85

REPLACE FLUORESCENT BULB/TUBE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Turned off power to light.		
2. Placed step ladder--if possible; used assistant.		
3. Removed shield.		
4. Removed all bulbs in fixtures--made sure to keep defective bulb/tube separate.		
5. Cleaned reflector surface of light with soft, dry cloth.		
6. Replaced bulbs/tubes.		
7. Turned light on to see if it worked.		
8. Cleaned shield and replaced.		
9. Carried all bulbs/tubes to trash bin and broke them.		
10. Returned all tools and equipment to keeping place.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 86

TASK

Attach a separable plug to appliance.

STANDARD OF PERFORMANCE OF TASK

The replaced plug must be securely fastened with no bare metal touching the prongs; the plug must work properly when the appliance is turned on and off.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

New plug
Screwdriver
Knife

Wire cutters
Wire strippers
Needle-nosed pliers

ENABLING OBJECTIVES

1. Identify factors that may account for the need to replace a plug on an appliance cord.
2. Explain worker's standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Miller. **Industrial and Residential Electricity**, 3d ed., pp. 131, 288.

TEACHING ACTIVITIES

1. Assign reading materials in the class text and supplement these as necessary with information from other sources.
2. List on the blackboard and discuss the tools and materials required for replacing a defective plug.
3. Demonstrate the procedure for cutting and preparing wire for fastening to a plug and show student how to tie the underwriter's knot.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching activity.

PERFORMANCE OBJECTIVE 86

CRITERION-REFERENCED MEASURE

Questions

1. What tools are used for stripping insulation from wire?
2. Power must be turned off when working on electrical plug. True or False?
3. Cord must be cut _____ from plug.

Answers

1. Wire stripper and knife
2. True
3. one inch

Practical Application

Have student attach a separable plug to appliance.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 86 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 86

ATTACH A SEPARABLE PLUG TO APPLIANCE

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Unplugged the appliance.		
2. Cut cord one inch from plug.		
3. Split cord covering two inches from end, exposing insulation covered wires.		
4. Stripped the insulation from wires so that 1/2 inch of copper wire was showing.		
5. Removed disk that slid over the prongs on the new plug.		
6. Pushed the wire through opening on the new plug. NOTE: The split wire must be past the end of the plug.		
7. Tied underwriter's knot in wires.		
8. Looped the wires around the prongs of the plug so that they formed an "S."		
9. Formed a loop on the end of each wire.		
10. Attached the wires to the screws in a clockwise direction: black to brass, white to chrome, and green to green.		
11. Tightened screws.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 86

ATTACH A SEPARABLE PLUG TO APPLIANCE

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
12. Replaced disk covering.		
13. Plugged in appliance and checked performance.		
14. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 87

TASK

Replace starter switch in fluorescent lights.

STANDARD OF PERFORMANCE OF TASK

The light must work properly when turned on; after light has built to maximum brightness there can be no flickering.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Stepladder
New starter switch
Screwdriver

ENABLING OBJECTIVES

1. Identify factors which may account for a starter switch not functioning properly.
2. Explain worker's standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Miller. **Industrial and Residential Electricity**, 3d ed., pp. 267-75.

TEACHING ACTIVITIES

1. Acquire handout literature from a local supplier that sells fluorescent fixtures and use this information to supplement reading assignments in the class textbook.
2. Assign student to troubleshoot fluorescent fixture problems.
3. Explain safety precautions.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 87

CRITERION-REFERENCED MEASURE

Questions

1. Loose bulbs will cause light fixtures not to work properly. True or False?
2. Once bulbs are burning bright there should be no flickering. True or False?
3. Tightening a switch may sometimes correct a problem. True or False?

Answers

1. True
2. True
3. True

Practical Application

Have student replace starter switch in fluorescent lights.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 87 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 87
REPLACE STARTER SWITCH IN FLUORESCENT LIGHTS

Student's Name _____ **Date** _____

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Turned off power to light.		
2. Placed stepladder; removed shield.		
3. Removed defective starter switch.		
4. Installed new starter switch.		
5. Replaced shield.		
6. Turned light on and checked performance.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____ **Date** _____

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 88

TASK

Replace defective light socket and tighten.

STANDARD OF PERFORMANCE OF TASK

When completed, the socket cannot wobble when switch is snapped on and off.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

New socket
Screwdriver
Wire
Wire cutters

ENABLING OBJECTIVES

1. Describe factors that may contribute to the development of defects in light sockets.
2. Explain worker's standards.
3. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Miller. **Industrial and Residential Electricity**, 3d ed., pp. 298-301.

TEACHING ACTIVITIES

1. Supplement reading assignments in the class text with a representation of handyman type paperback materials.
2. List on the blackboard the tools that are required for making common electrical repairs and explain the proper use of each tool.
3. Demonstrate the disassembly and reassembly of the electrical parts.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 88

CRITERION-REFERENCED MEASURE

Questions

1. Loose connections may exist because of rough treatment. True or False?
2. The socket can wobble some when the switch is snapped on and off. True or False?
3. List two tools required when replacing a defective light socket.

Answers

1. True
2. False
3. Wire cutters and screwdriver

Practical Application

Have student replace defective light socket and tighten.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 88 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 88
REPLACE DEFECTIVE LIGHT SOCKET AND TIGHTEN

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Unplugged lamp or fixture.		
2. Removed bulb and shade.		
3. Removed harp.		
4. Separated socket body and shell from cap.		
5. Removed terminal screws from socket cap and removed wires.		
6. Screwed new cap to lamp shade and tightened set screw.		
7. Removed socket from new shell, leaving cardboard insulation inside shell.		
8. Loosened terminal screws on socket.		
9. Bent loop on each wire and connected one wire to each terminal screw.		
10. Put shell and cardboard insulator over socket and snapped shell into the socket cap.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 89

TASK

Replace defective electrical wall outlet.

STANDARD OF PERFORMANCE OF TASK

The receptacle must be in the center of the outlet box; all wires and fasteners must be securely fastened; the receptacle must function properly.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

New receptacle
Wire cutters
Screwdriver

ENABLING OBJECTIVES

1. Describe factors which might contribute to the need to replace a wall outlet.
2. Explain worker's standards.
3. Demonstrate safe work practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Miller. **Industrial and Residential Electricity**, 3d ed., pp. 288-92, 131-43.

TEACHING ACTIVITIES

1. Assign related reading materials to the student.
2. Illustrate on the blackboard and discuss electrical circuits as they begin at the main entrance box.
3. Guide the student as he/she replaces a wall outlet.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 89

CRITERION-REFERENCED MEASURE

Questions

1. The white wire is connected to the _____ terminal screw.
2. A test light is used to check receptacle for power. True or False?
3. To remove receptacles the power does not have to be turned off. True or False?

Answers

1. silver
2. True
3. False

Practical Application

Have student replace defective electrical wall outlet.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 89 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 89
REPLACE DEFECTIVE ELECTRICAL WALL OUTLET

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Turned off the current to the circuit.		
2. Tested the outlet receptacle with a test light or appliance to be sure the power was off.		
3. Removed faceplate on outlet receptacle.		
4. Unscrewed mounting screws that held the receptacle in the box.		
5. Pulled out old receptacle.		
6. Disconnected wires from old receptacle. Noted the original placement of the wires.		
7. Replaced wires on the new receptacle. NOTE: Wires must be twisted clockwise around screw: black wire on brass screw, white on chrome screw, and bare or green wire on green screw.		
8. Tightened all screws.		
9. Folded wires and pushed them back into box.		
10. Replaced mounting screws and tightened. NOTE: The receptacle was straight in the outlet box.		
11. Reinstalled faceplate.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 89
REPLACE DEFECTIVE ELECTRICAL WALL OUTLET

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
12. Turned on power.		
13. Plugged in appliance and checked performance.		
14. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR ELECTRICAL SYSTEMS

PERFORMANCE OBJECTIVE 90

TASK

Locate circuit overload.

STANDARD OF PERFORMANCE OF TASK

When power is shut off to overloading unit or overloading cause is corrected, amperage must return to normal for that circuit.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Overloaded circuit
Screwdriver
Split-core ammeter and amprobe

ENABLING OBJECTIVES

1. Describe factors that may contribute to circuit overloads.
2. Explain worker's standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Miller. **Industrial and Residential Electricity**, 3d ed., pp. 188-89.

TEACHING ACTIVITIES

1. Complete reading assignments that cover related information.
2. Assign student to check the number of circuit breakers in entrance box at home and be prepared to give oral report.
3. Present a review and summation of events using the blackboard.
4. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 90

CRITERION-REFERENCED MEASURE

Questions

1. Any conductor that may carry an electrical charge is surrounded by a(n) _____ field.
2. Circuit breakers are located in the _____ of a home.
3. Name equipment used to check for an overloaded circuit.

Answers

1. electromagnetic
2. entrance box or service panel
3. Amprobe and amp meter

Practical Application

Have student locate circuit overload.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 90 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 90

LOCATE CIRCUIT OVERLOAD

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Located panel board supplying overloaded circuit.		
2. Removed panel board cover and visually inspected for tripped circuit breaker or blown fuse.		
3. Selected highest possible range on ammeter and placed split-core around circuit conductor.		
4. Reset circuit breaker or installed new fuses.		
5. Energized circuit.		
6. Observed meter scale and noted maximum reading.		
7. Compared amperage load with breaker or fuse rating.		
8. Computed amount of overload on circuit.		
9. Identified and checked all items connected to the circuit and computed electrical load of each.		
10. Compared actual load reading with computed load.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 90

LOCATE CIRCUIT OVERLOAD

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
11. Insulated each portion of circuit and checked load.		
12. Removed or replaced components causing overload, if necessary.		
13. Reinstalled panel board cover.		
14. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 91

TASK

Clean and lubricate fans/ventilators.

STANDARD OF PERFORMANCE OF TASK

The fan/ventilator will be lubricated according to specifications; all components will be inspected, cleaned, and reassembled.

SOURCE OF STANDARD

Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Cleaning solvent	Oil can
Lubricants	Personal safety equipment
Compressed air/steam	Steel brush
Grease gun	Wiping rags
Mechanic's tool box (hand tools)	Manufacturer's specifications

ENABLING OBJECTIVES

1. Demonstrate safe work practices.
2. Read and interpret manufacturer's specifications.
3. Demonstrate correct use of hand tools.

RESOURCES

1. Manufacturer's specifications (for fans/ventilators).
2. Althouse, Turnquist, and Bracciano. **Modern Refrigeration and Air Conditioning**, 5th ed., pp. 804-13, 794-99.

TEACHING ACTIVITIES

1. Discuss the proper cleaning procedure using solvents and list the safety hazards.
2. Explain the proper kinds of lubrication to be used.
3. Have a lubrication supplier give a lecture on the proper oil or grease for the job.
4. Show the difference between a clean fan and a dirty fan for air flow.
5. Demonstrate proper tension for all drive belts.

PERFORMANCE OBJECTIVE 91

CRITERION-REFERENCED MEASURE

Questions

1. Compressed air should be used with caution and respect. True or False?
2. Testing power source with a meter is a sound safety procedure. True or False?
3. Belt tension is critical for proper fan operation. True or False?

Answers

1. True
2. True
3. True

Practical Application

Have student clean and lubricate fans/ventilators.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 91 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 91
CLEAN AND LUBRICATE FANS/VENTILATORS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Located fan/ventilator.		
2. Locked out system power.		
3. Removed guards, shrouds, and covers; cleaned, as necessary.		
4. Located and cleaned oiling points; added oil according to manufacturer's specifications.		
5. Located, cleaned, and greased fittings according to manufacturer's specifications.		
6. Cleaned fan blades, housings dampers, and duct work as necessary.		
7. Adjusted fan blades as necessary.		
8. Cleaned and replaced air filters as necessary.		
9. Checked belt for damage. Replaced as necessary.		
10. Adjusted belt tension as necessary.		
11. Fastened guards, shrouds, and covers.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 91
CLEAN AND LUBRICATE FANS/VENTILATORS

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
12. Unlocked/checked operation according to manufacturer's specifications.		
13. Turned off equipment.		
14. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature

Date

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 92

TASK

Lubricate air compressor.

STANDARD OF PERFORMANCE OF TASK

When completed, all lubricating points and fittings must be lubricated using manufacturer's specified lubricant grades; points and fittings must be reassembled to specifications.

SOURCES OF STANDARD

Wisconsin Writing Team
Anderson. *Home Refrigeration and Air Conditioning*, p. 160.

CONDITIONS FOR PERFORMANCE OF TASK

Pneumatic system with air
compressor
Lubricants
Grease gun

Personal safety equipment
Oil can
Wiping rags

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Identify various types of lubricants.
3. Use a pneumatic system with an air compressor.

RESOURCES

1. Manufacturer's specifications.
2. Althouse et al. *Modern Refrigeration and Air Conditioning*, 5th ed., pp. 238-41.

TEACHING ACTIVITIES

1. Research compressor lubricants and report to class.
2. Have a local supplier of lubricants give a lecture to the class on applications.
3. Describe the proper cleaning procedure prior to lubrication.
4. Discuss F.L.R. systems with class.
5. Explain how an air filter on the intake is of benefit to the compressor.

PERFORMANCE OBJECTIVE 92

CRITERION-REFERENCED MEASURE

Questions

1. What is viscosity?
2. Why should wiping rags be included in equipment needed?
3. Why is an air filter necessary on the intake side of the compressor?

Answers

1. The flowing ability of a liquid due to its molecular structure.
2. Because all dirt and contaminated lubricants should be removed from fittings or cups before re-lubrication.
3. To prevent dirt and grit from entering the compressor, causing damage.

Practical Application

Have student lubricate air compressor.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 92 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 92

LUBRICATE AIR COMPRESSOR

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Unacceptable	Unacceptable
1. Locked out system power.		
2. Drained water/liquid from air tank.		
3. Disassembled machinery/equipment to expose lubricating points as necessary.		
4. Inspected for defective or worn parts. Repaired or reported as necessary.		
5. Cleaned oiling points and added oil according to manufacturer's specifications.		
6. Cleaned lubrication fittings and lubricated according to manufacturer's specifications.		
7. Reassembled machinery/equipment.		
8. Unlocked/started power unit to build up specified pressure, as necessary.		
9. Checked operation in accordance with manufacturer's specifications.		
10. Turned off equipment.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 93

TASK

Calibrate and adjust thermostat.

STANDARD OF PERFORMANCE OF TASK

The thermostat will be calibrated and adjusted in accordance with manufacturer's specifications and reflect manufacturer's specified accuracy.

SOURCES OF STANDARD

Wisconsin Writing Team
Brumbaugh. **Heating, Ventilating and Air Conditioning**, Volume 2,
pp. 118-21.

CONDITIONS FOR PERFORMANCE OF TASK

HVAC system with faulty or erratic thermostat	Pliers
Control line test gauge	Screwdrivers
Manufacturer's specifications	Thermometer
Personal safety equipment	Wiping cloth
Sealing compound	Small hex head set

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Read and interpret manufacturer's specifications.
3. Demonstrate proper use of a control line tool gauge.

RESOURCES

1. Manufacturer's specifications.
2. Althouse et al. **Modern Refrigeration and Air Conditioning**, 5th ed., pp. 13, 14, 63, 64, and 254-64.

TEACHING ACTIVITIES

1. Instruct student to research thermostats and discuss their functions in class.
2. After reviewing manufacturer's specifications explain the procedure for calibration of a particular thermostat.
3. Restore and implement the electrical safety rules before starting.
4. Diagram a thermostat circuit and explain how it works.
5. Demonstrate calibration procedures using manufacturer's specifications.

PERFORMANCE OBJECTIVE 93

CRITERION-REFERENCED MEASURE

Questions

1. What is calibration?
2. What is a pneumatic control?
3. What is a thermostat?

Answers

1. Determining the correct measure according to a preset scale or marker.
2. Control operated by air pressure.
3. An automatic temperature sensing device used for regulating temperatures.

Practical Application

Have student calibrate and adjust thermostat.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 93 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 93

CALIBRATE AND ADJUST THERMOSTAT

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Disconnected circuit or locked out breaker.		
2. Located thermostat.		
3. Reviewed manufacturer's specifications.		
4. Disassembled thermostat to expose adjusting screws or contact points as necessary.		
5. Calibrated and adjusted. a. Bimetal Strip Temperature Sensor 1. Set the thermostat to cut-in temperature according to manufacturer's specifications. 2. Turned adjusting screw or bent contact points to obtain specified temperature by using screwdriver, pliers, and feeler gauges. 3. Set thermostat at cut-out temperature according to manufacturer's specifications. 4. Turned adjusting screw or bent contact points to obtain specified temperature.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 93

CALIBRATE AND ADJUST THERMOSTAT

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
b. Pneumatic Temperature Controller 1. Set thermostat set-point dial at room temperature. 2. Set pressure adjusting screw so the control pressure was at the mid-point of the spring range of the controlled device. 3. Turned thermostat dial to the desired control temperature, e.g., 65°F for heating or 78 °F for cooling. c. Remote Bulb Sensing Element Adjusted spring/post assembly by turning adjustment nut.		
6. Cleaned and replaced defective parts as necessary.		
7. Checked adjusted operation according to manufacturer's specifications.		
8. Sealed adjustment screws with compound to prevent loss of calibration as necessary.		
9. Reassembled.		
10. Unlocked power.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 94

TASK

Replace air filters.

STANDARD OF PERFORMANCE OF TASK

The air filter components will be inspected for damage and wear, and they will be cleaned and reassembled.

SOURCE OF STANDARD

State of Wisconsin Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

HVAC system with dirty/defective air filter	Personal safety equipment
Replacement air filter	Screwdrivers
Cleaning solvents	Steel brush
Adjustable wrench	Wiping rags
Manufacturer's specifications	Oil can (with lubricant)

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Read and interpret manufacturer's specifications.
3. Demonstrate proper use of hand tools.

RESOURCES

1. Manufacturer's specifications.
2. Swain and Arrott. **Power Handbook**, p. 54.
3. Althouse et al. **Modern Refrigeration and Air Conditioning**, pp. 808-10.

TEACHING ACTIVITIES

1. Contact your local supplier of air filters and list the different kinds of filters available for this operation.
2. Instruct student to research air flow and velocity characteristics of various filter media.
3. Relate to the class the procedure to replace a filter.
4. Describe what to look for when inspecting for damage and wear.
5. Explain how to unlock power in proper sequence.
6. Demonstrate to student how to remove old filter and install new filter.

PERFORMANCE OBJECTIVE 94

CRITERION-REFERENCED MEASURE

Questions

1. Humidity affects the life of the filter media. True or False?
2. The dewpoint is where condensation starts. True or False?
3. All filters perform the same function. True or False?
4. Air flow means the speed the air moves through the filter. True or False?

Answers

1. True
2. True
3. True
4. False

Practical Application

Have student replace air filters.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 94 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 94

REPLACE AIR FILTERS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Located air filter.		
2. Locked out system power.		
3. Removed cover or door or dismantled system to expose air filter.		
4. Loosened fasteners if applicable.		
5. Removed filter.		
6. Cleaned ducts and filter supports as necessary.		
7. Inspected any dampers, belts, fans and ducts for damage and wear.		
8. Installed filter according to manufacturer's specifications.		
9. Reattached cover or door or reassembled system to enclose filter.		
10. Unlocked power.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 95

TASK

Calibrate and adjust pressure controls.

STANDARD OF PERFORMANCE OF TASK

When completed, the specified pressures will be indicated on the pressure gauges within manufacturer's specifications.

SOURCES OF STANDARD

Wisconsin Writing Team
Kirk et al. *Instrumentation*, 3d ed., pp. 289-92.

CONDITIONS FOR PERFORMANCE OF TASK

Pipeline containing pressure gauges
and pressure control valves
Specified operating pressures
Mechanic's tool box (hand tools)
Manufacturer's specifications
Personal safety equipment

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Read and interpret manufacturer's recommendations.
3. Select proper tools.

RESOURCES

1. Manufacturer's specifications.
2. Althouse et al. *Modern Refrigeration and Air Conditioning*, 5th ed., pp. 19, 20, and 264-66.

TEACHING ACTIVITIES

1. Instruct student to research pressure controls pertaining to heating/air conditioning systems.
2. Visit a company that calibrates instruments for a demonstration.
3. Discuss F.R.L.'s and their functions in control systems.
4. Research and discuss pressure regulators.
5. Diagram a pressure control system showing all pertinent components.
6. Discuss tools to calibrate and adjust pressure controls.

PERFORMANCE OBJECTIVE 95

CRITERION-REFERENCED MEASURE

Questions

1. All pressure controls are the same. True or False?
2. What are F.R.L.'s?
3. There are set limits on regulators. True or False?

Answers

1. False
2. Filter, regulator, and lubricator systems
3. True

Practical Application

Have student calibrate and adjust pressure controls.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 95 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 95
CALIBRATE AND ADJUST PRESSURE CONTROLS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Started the system.		
2. Read and recorded pressure gauge readings.		
3. Determined control adjustments to be made.		
4. Removed covers as necessary.		
5. Inspected parts for damage, wear, and freedom of operation.		
6. Adjusted pressure to specified readings on pressure gauges by loosening and adjusting needle valve.		
7. Locked needle valve.		
8. Replaced covers.		
9. Tested/adjusted operational pressures and readings to manufacturer's specifications.		
10. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 96

TASK

Remove dust from heating/cooling system.

STANDARD OF PERFORMANCE OF TASK

All visible dust must be removed. When areas are wiped with a clean, light-colored cloth, the cloth must not show dark smudges.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Heating/cooling system in need of dust removal
Vacuum
Cleaning cloth
Small broom
Brush

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Inspect units for collection of dust.

RESOURCE

Althouse et al. **Modern Refrigeration and Air Conditioning**, 5th ed., pp. 69, 70, 335, 353-54, 649, 668, 669, and 728.

TEACHING ACTIVITIES

1. Show student where to look for dust on and inside of the heating/cooling unit.
2. Demonstrate how to remove dust from the heating/cooling unit.

PERFORMANCE OBJECTIVE 96

CRITERION-REFERENCED MEASURE

Questions

1. Dust does not affect the operation of the heating/cooling unit. True or False?
2. Dust can be blown into the living area if the unit is not cleaned. True or False?
3. Dust comes from outside the house or building. True or False?

Answers

1. False
2. True
3. False

Practical Application

Have student remove dust from heating/cooling system.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 96 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 96
REMOVE DUST FROM HEATING/COOLING SYSTEM

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Shut unit down; allowed heater to cool.		
2. Located (by sight or schematic) all places where dust was likely to collect, i.e., top, sides, beneath units, on bellows, and in duct work turns.		
3. Opened all units that were being restarted and inspected them for dust accumulation.		
4. Used vacuum to extract dust, where possible.		
5. Used long handled 12" dust mop in hard-to-reach areas.		
6. Wrapped rag around corn broom head to use in hard-to-reach places.		
7. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 97

TASK

Lubricate heating system.

STANDARD OF PERFORMANCE OF TASK

There can be no friction noises; on parts requiring grease fitting, pressure on fitting should be held until old, discolored grease has been expelled and new grease shows; machinery must be wiped clean of all excess grease and oil.

SOURCES OF STANDARD

West Virginia Writing Team
Brainard. *Handbook for School Custodians*, pp. 282-85.

CONDITIONS FOR PERFORMANCE OF TASK

Heating system components in
need of lubrication
Grease gun
Oil applicator
Cloth

ENABLING OBJECTIVE

Demonstrate safe working practices.

RESOURCE

Althouse et al. *Modern Refrigeration and Air Conditioning*, 5th ed.,
pp. 238-39, 728.

TEACHING ACTIVITIES

1. Show student where to lubricate or oil heating unit.
2. Demonstrate how to oil the motors or add lubricant to the blower shaft.
3. Remove excess or spilled lubricant or oil.

PERFORMANCE OBJECTIVE 97

CRITERION-REFERENCED MEASURE

Questions

1. Should the power to the heating unit be turned off or on?
2. Grease should be installed in grease caps or fittings until filled. True or False?
3. Motors should be oiled with only a few drops of oil. True or False?

Answers

1. Off
2. True
3. True

Practical Application

Have student lubricate heating system.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 97 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 97

LUBRICATE HEATING SYSTEM

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Located all points to be lubricated using schematic charts and sight.		
2. Selected lubricant--grease, light oil, or heavy oil.		
3. Removed plug and drained housing.		
4. Flushed with light oil.		
5. Refilled, using specified weight of oil. NOTE: Took precautions not to apply too much lubricant so that it spilled or oozed out onto a part that wasn't supposed to be lubricated.		
6. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 98

TASK

Light gas-fed system.

STANDARD OF PERFORMANCE OF TASK

Both pilot flame and furnace flame must be bright blue; by changing thermostat settings, furnace must go through a minimum of three ignition and shutoff periods without flame out.

SOURCES OF STANDARD

West Virginia Writing Team
Custodial Trades, Heating and Ventilation for Building Custodian I.

CONDITIONS FOR PERFORMANCE OF TASK

Gas-fed heating system with
pilot and heat flame out
Gas turned on
Long extension for holding match
Safety goggles

ENABLING OBJECTIVES

1. Demonstrate safe working practices.
2. Read lighting instructions on furnace.
3. Locate pilot to be lit.

RESOURCES

1. Lander. *Home Repair and Maintenance*, pp. 284-85.
2. Althouse et al. *Modern Refrigeration and Air Conditioning*, 5th ed., pp. 711-28.

TEACHING ACTIVITIES

1. Demonstrate safe working conditions while lighting a pilot.
2. Instruct student to locate the pilot.
3. Show how to light pilot, turn gas valve on, and operate heating unit.

PERFORMANCE OBJECTIVE 98

CRITERION-REFERENCED MEASURE

Questions

1. The power to the heating unit should be turned off before lighting the pilot. True or False?
2. Can the smell of gas used to burn in a gas heating unit be detected? Yes or No?
3. A yellow flame indicates too little _____ air.
 - a. primary
 - b. secondary

Answers

1. True
2. Yes
3. a.

Practical Application

Have student light gas-fed system.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 98 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 98

LIGHT GAS-FED SYSTEM

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Located lighting instructions on furnace.		
2. Located pilot light.		
3. Removed protection plate.		
4. Set controls according to directions.		
5. Depressed pilot light button.		
6. Applied open flame to pilot light.		
7. Held pilot light button down for prescribed period of time.		
8. Released pilot light button.		
9. Turned control knob to operate.		
10. Set thermostat at high temperature (80°). Checked to make sure fire was on. Repeated process if flame did not come on.		
13. Set thermostat at desired temperature.		
12. Returned in 30 minutes and checked temperature with thermostat.		
12. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 99

TASK

Change filters.

STANDARD OF PERFORMANCE OF TASK

The filter area must be cleaned and resealed, fittings and covers must fit securely, and soiled filter must be placed in a suitable container so that dust cannot re-enter atmosphere. Area must be wiped clean of all dust and dirt. Soiled filter must be wrapped and disposed of.

SOURCE OF STANDARD

West Virginia Writing Team

CONDITIONS FOR PERFORMANCE OF TASK

Dirty filter in a heating/cooling
system
New filters
Area to clean filters
Cleaning detergent
Necessary hand tools
Safety goggles

ENABLING OBJECTIVE

Demonstrate safe working practices.

RESOURCES

1. Lander. *Home Repair and Maintenance*.
2. Althouse et al. *Modern Refrigeration and Air Conditioning*, 5th ed., pp. 809-12.

TEACHING ACTIVITIES

1. Show student the importance of cleaning or changing filters.
2. Show student where filters in the furnace are located.
3. Demonstrate how to clean or change filters in a furnace.

PERFORMANCE OBJECTIVE 99

CRITERION-REFERENCED MEASURE

Questions

1. Permanent filters should be periodically cleaned by washing. True or False?
2. A disposable filter should be removed, thrown away, and replaced by a new, clean filter. True or False?
3. Infrequent cleaning or replacement of filters may result in laboring of the
 - a. gas supply
 - b. fan motor

Answers

1. True
2. True
3. b.

Practical Application

Have student change filters.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 99 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 99

CHANGE FILTERS

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Checked to be sure of needed change.		
2. Shut unit down; secured waste container and new filter.		
3. Removed guards.		
4. Extracted filter.		
5. Placed in waste container.		
6. Wiped dust and debris from filter area.		
7. Placed clean filter in frame.		
8. Closed door or cover.		
9. Restarted equipment.		
10. Disposed of used filter.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 100

TASK

Replace fuse on air conditioner.

STANDARD OF PERFORMANCE OF TASK

Full current must flow to compressor and fan.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

Air conditioner
Fuse
Fuse puller
Ohmmeter
Screwdriver

ENABLING OBJECTIVE

Explain why an appliance might be fused separately from the fused circuit that serves the unit.

RESOURCES

1. Naval Training Command. Builder Inc., Rate Training Manual.
2. Althouse et al. Modern Refrigeration and Air Conditioning, 5th ed., pp. 227-31, 265-66.

TEACHING ACTIVITIES

1. Complete reading assignments that cover related information.
2. Illustrate the details of a circuit servicing an appliance.
3. Present a review and summation of events using the blackboard.
4. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 100

CRITERION-REFERENCED MEASURE

Questions

1. What tool is used to remove blown fuses?
2. The ohmmeter is used to check for blown fuses. True or False?
3. A fuse too heavy may permit a conductor to overheat. True or False?

Answers

1. Fuse puller
2. True
3. True

Practical Application

Have student replace fuse on air conditioner.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 100 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 100

REPLACE FUSE ON AIR CONDITIONER

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Disconnected power to system.		
2. Removed inspection plate.		
3. Located blown fuse.		
4. Removed fuse.		
5. Measured resistance.		
6. Installed new fuse.		
7. Started system.		
8. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

DUTY MAINTAIN AND REPAIR HEATING AND COOLING SYSTEMS

PERFORMANCE OBJECTIVE 101

TASK

Replace door seals on refrigerator.

STANDARD OF PERFORMANCE OF TASK

The new gasket must fit securely to facing when shut so that a feeler gauge of .003 will not fit between seals; the door must be aligned so as to remain stationary when half open.

SOURCE OF STANDARD

Building Repairer V-TECS Guide

CONDITIONS FOR PERFORMANCE OF TASK

New seal	Cleaning solvent
Gasket notcher	Screwdrivers
Gasket stapler	Wrenches
Shim materials for hinges	Feeler gauges

ENABLING OBJECTIVES

1. Describe conditions that require the replacement of the seal on a refrigerator door.
2. Explain worker's standards.
3. Demonstrate safe working practices.

RESOURCES

1. Naval Training Command. **Builder Inc., Rate Training Manual.**
2. Althouse et al. **Modern Refrigeration and Air Conditioning**, 5th ed., pp. 337-38.

TEACHING ACTIVITIES

1. Share information about types of available gasket material with student.
2. Have student inspect the sealing materials on the doors of refrigerators at home and discuss.
3. Demonstrate the removal of an old seal and its replacement with a new unit.
4. Present a review and summation of events using the blackboard.
5. Evaluate the teaching experience.

PERFORMANCE OBJECTIVE 101

CRITERION-REFERENCED MEASURE

Questions

1. Seals in newer appliances have a(n) _____ like action that ensures longlasting and effective action.
2. The gasket must fit securely to facing when shut so that a feeler gauge of _____ will not fit between seals.
3. Materials should have adequate resiliency so that with door closed an adequate seal will be affected. True or False?

Answer

1. accordion
2. .003
3. True

Practical Application

Have student replace door seals on refrigerator.

Method of Evaluating Practical Application

Use Checklist for Performance Objective 101 to determine if the assignment was completed for competency.

CHECKLIST FOR PERFORMANCE OBJECTIVE 101

REPLACE DOOR SEALS ON REFRIGERATOR

Student's Name _____

Date _____

DIRECTIONS TO STUDENT

Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR

Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. An acceptable rating on each item is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Acceptable	Unacceptable
1. Disconnected power from unit.		
2. Removed door from unit.		
3. Removed clips or screws holding old seal.		
4. Removed old seal.		
5. Cleaned door seal area.		
6. Cut new seal to fit.		
7. Installed new seal.		
8. Reinstalled door.		
9. Adjusted seal clearance on door and hinges.		
10. Connected power to unit.		
11. Performed all tasks in a safe manner.		

APPROVED: YES ____ NO ____

Evaluator's Signature _____

Date _____

APPENDICES

APPENDIX A
DUTY/TASK LIST AND JOB TITLES

APPENDIX A DUTY/TASK LIST

DUTY/TASK	P.O./PAGE NO.
A. PERFORM SAFE WORK PRACTICES	
Construct and erect scaffolds.	1/5
Store equipment.	2/8
List and post safety hazards within building.	3/12
Extinguish fires with appropriate fire extinguisher.	4/15
Carry and place ladder.	5/18
B. DEMONSTRATE THE BASIC ABILITY TO CARE FOR INTERIOR SURFACES AND SURFACE COVERINGS	
Wet shampoo carpet.	6/23
Vacuum carpet.	7/26
Sweep carpet by hand.	8/29
Spot clean carpet.	9/33
Remove heavy soil from carpet.	10/36
Remove gum or candle wax from carpet.	11/39
Dry shampoo carpet (self-contained carpet extraction).	12/43
Clean terrazzo floors.	13/47
Vacuum floor surfaces.	14/50
Sweep uncarpeted floors.	15/53
Strip floor wax using scrubbing machine.	16/57
Scrub floors by using buffer.	17/61
Polish high-gloss floor surfaces.	18/64
Damp mop uncarpeted floors.	19/68
Wet mop tile floors.	20/71
Apply floor wax/sealer.	21/74
Treat dust mops and dust cloths.	22/79
Replace floor tile.	23/83
Wash walls.	24/86
Polish ornamental metals.	25/89
Clean wood surfaces.	26/92
Clean porcelain surfaces.	27/95
Clean painted surfaces.	28/98
Fill in cracks in plaster using spackling compound.	29/101
C. DEMONSTRATE THE BASIC ABILITY TO CARE FOR BUILDING EXTERIOR AND GROUNDS	
Install/replace glass.	30/105
Patch composition shingle/built-up roof.	31/109
Unclog downspouts.	32/113
Free window from sash.	33/116
Clean glass surface.	34/119
Varnish wood surface.	35/122
Sharpen lawn mower blade.	36/125
Clean metal surfaces using wire brush/steel wool.	37/128
Clean metal surfaces using solvent.	38/131

	DUTY/TASK	P.O./PAGE NO.
	Caulk doors and windows.	39/134
	Prepare seedbed.	40/137
	Fertilize plants.	41/140
	Spray plants for pest control.	42/144
	Renovate turf.	43/149
	Reseed worn spots on turf.	44/153
D.	DEMONSTRATE THE BASIC ABILITY TO USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR INTERIOR AND EXTERIOR OF BUILDING	
	Cut lumber to size with radial arm saw.	45/158
	Cut lumber to size with portable power saw.	46/161
	Cut lumber to size with handsaw.	47/164
	Cut irregular shapes with band saw.	48/167
	Cut lumber to size with table saw.	49/170
	Drill holes in metal with portable device.	50/173
	Remove damaged screws and other threaded hardware.	51/176
	Tighten loose furniture components.	52/179
	Spot paint.	53/182
	Free sticking doors.	54/185
	Ease sticking drawers.	55/188
	Disassemble and clean wet/dry vacuum.	56/191
	Disassemble and clean buffing machine.	57/194
	Replace butt hinge.	58/197
	Replace acoustical tile.	59/200
	Remove paint by using scraper/paint remover.	60/203
	Remove and replace door lock set.	61/206
	Rebuild stair step.	62/209
	Realign door.	63/212
	Prepare surface for wallpaper.	64/215
	Prepare new wood for painting.	65/218
	Install resilient floor covering.	66/221
	Install furring strips.	67/224
	Install drop ceiling.	68/228
	Hang wallpaper.	69/231
	Hang drapes.	70/234
	Fill nail holes.	71/237
	Cut molding using miter box.	72/240
	Cut sheet metal.	73/243
	Remove broken bolt.	74/246
	Spot repair stucco.	75/249
E.	DEMONSTRATE THE BASIC ABILITY TO USE HAND AND POWER TOOLS TO MAINTAIN AND REPAIR THE PLUMBING AND WATER SYSTEMS	
	Unclog drains.	76/253
	Thaw frozen water pipes.	77/256
	Replace faucet components.	78/259
	Cut plastic pipe.	79/262
	Cut metal tubing.	80/265
	Clear sewage using powered sewer auger.	81/268

DUTY/TASK**P.O./PAGE NO.****F. DEMONSTRATE THE BASIC ABILITY TO MAINTAIN AND REPAIR ELECTRICAL SYSTEMS**

Remove and replace fuses.	82/272
Replace faulty electrical cords and plugs.	83/275
Replace light switches.	84/278
Replace fluorescent bulb/tube.	85/281
Attach a separable plug to appliance.	86/284
Replace starter switch in fluorescent lights.	87/288
Replace defective light socket and tighten.	88/291
Replace defective electrical wall outlet.	89/294
Locate circuit overload.	90/298

G. DEMONSTRATE THE ABILITY TO MAINTAIN HEATING AND COOLING SYSTEMS

Clean and lubricate fans/ventilators.	91/303
Lubricate air compressor.	92/307
Calibrate and adjust thermostat.	93/310
Replace air filters.	94/314
Calibrate and adjust pressure controls.	95/317
Remove dust from heating/cooling system.	96/320
Lubricate heating system.	97/323
Light gas-fed system.	98/326
Change filters.	99/329
Replace fuse on air conditioner.	100/332
Replace door seals on refrigerator.	101/335

APPENDIX A

JOB TITLES

D.O.T. 382.137-010 Maintenance Supervisor

D.O.T. 382.664-010 Janitor

APPENDIX B
DEFINITIONS OF TERMS

APPENDIX B

DEFINITIONS OF TERMS

A number of terms frequently used in this guide may be unfamiliar to the reader; others may be familiar, but in the context of this handbook they have been assigned special meanings.

AFFECTIVE.

Skills which emphasize an attitude, feeling, emotion, or degree of acceptance and rejection.

CATALOG.

A comprehensive collection of performance objectives, performance guides, and related data developed in a specific domain.

CBVE (COMPETENCY-BASED VOCATIONAL EDUCATION).

A methodology of instruction that (a) identifies the abilities and skills needed for on-the-job performance; (b) informs students and teachers of the precise and detailed learning objectives required to achieve these competencies; (c) emphasizes performance standards in testing, course requirements, and/or graduation; and (d) facilitates learning by letting each student master the tasks prior to advancing to another.

CHECKPOINT.

A point in the development of the V-TECS product when material must be sent to V-TECS central office for quality review.

CIP (CLASSIFICATION OF INSTRUCTION PROGRAM) CODE.

A code developed by the U.S. Office of Education to identify a specific cluster of related jobs for training program identification.

COGNITIVE.

Skills which emphasize the recall of knowledge and development of intellectual abilities.

COMPETENCY.

Proficiency in the knowledge and skills required of workers in a particular occupation or occupational specialty; a term used by educators to mean program goal, duty, task, or objective. In some cases the terms are essentially synonymous.

CONDITIONS.

Describes the situation for competent task performance, including tools and equipment to be used, and limitations under which the tasks will be performed.

CONSORTIUM.

A group of state agencies, institutions, or other entities which have been legally constituted through letters of commitment, agreements, or by assignment of higher authorities to work together toward the solution of problems in education. A consortium, for the purposes of this work, must have membership from autonomous agencies and institutions which cut across state boundaries as they attempt to solve problems or meet goals.

CRITERION-REFERENCED MEASURES.

An evaluative procedure used to determine if a student has mastered a performance objective.

CROSS-REFERENCE TABLE.

A table that identifies the relationship among duties and tasks found in the occupational inventory and the performance objectives in the final catalog. Also noted are percentages of incumbents performing the tasks by D.O.T.

CURRICULUM GUIDE.

An instructional resource developed from a V-TECS catalog to guide CBVE for an occupation.

DICTIONARY OF OCCUPATIONAL TITLES (D.O.T.).

A document published by the U.S. Department of Labor, Employment and Training Administration. This publication groups occupations into systematic occupational classification structures based on interrelationships of job tasks and requirements.

DISTRACTOR.

An incorrect response to a multiple-choice or true/false test item.

DOMAIN (OCCUPATIONAL DOMAIN).

A group of job titles that are related on the basis of required skills and knowledge.

D.O.T. CODE.

A nine-digit number used to identify a specific job within a given calendar year.

DUTY.

A cluster of related tasks performed by incumbent workers in an occupational domain.

ENABLING OBJECTIVE.

An objective related to background knowledge or skills that are prerequisite to the mastery of a given task.

FIELD REVIEW.

The process of using and refining drafts of V-TECS materials for the purpose of identifying content errors or technical problems.

GUIDE SHEET.

Instructional information including the duty, performance objective, task, performance of standard, survey of standard, conditions for performance of task, enabling objectives, resources, teaching activities, criterion-referenced measures, and performance guide.

JOB.

A group of tasks performed by a job incumbent.

JOB INCUMBENT.

An individual who is currently employed in an occupation.

OCCUPATIONAL ANALYSIS (Task Analysis).

The process of reviewing elements of a job for the purpose of improving training program content across program levels of vocational-technical education.

OCCUPATIONAL INVENTORY (Task Inventory Booklet).

A survey instrument listing tasks performed and tools and equipment used by job incumbents in an occupational domain.

OCCUPATIONAL SURVEY.

The procedures for collecting data to identify the duties and tasks that comprise one or more jobs, job types, or career field ladders for the collection and analysis of information concerning such duties.

O.E./CIP CODE.

A code developed by the U.S. Office of Education to identify a specific cluster of related jobs for training program identification.

PERFORMANCE-BASED INSTRUCTION.

Instruction which requires the learners demonstration of specific competencies. The desired abilities are selected before the instruction is described and are clearly defined as observable performance objectives.

PERFORMANCE CHECKLIST.

A list of performance steps derived from the performance guide to record acceptable or unacceptable performance of each step of a task.

PERFORMANCE GUIDE (PG).

A series of steps required for performance of a task arranged in the sequence ordinarily followed.

PERFORMANCE OBJECTIVE (PO).

A statement, in precise measurable terms, of a particular behavior to be exhibited by a learner under specified conditions, including a standard of performance.

PSYCHOMOTOR.

Skills which emphasize manipulation of material or tools.

QUALITY REVIEW.

A review of content by V-TECS staff or designated representative to examine quality of content, format, and style of V-TECS product(s).

RESOURCES.

Materials which are used to develop instruction and/or learner-specific objectives.

SOURCE OF STANDARD.

A person or origin from which the information establishing the standard is received.

STANDARD.

The criteria used to determine if a task has been successfully or unsuccessfully performed.

STATE-OF-THE-ART REFERENCE.

Current materials from which information or resources can be found to facilitate instruction.

STATE-OF-THE-ART (SOA) STUDY.

Research conducted to determine the current status of performance-based instructional materials and practices in the domain area under study and to obtain other information that might be useful in catalog development.

SUBJECT-MATTER EXPERT.

A highly experienced person (incumbent worker/instructor) who assists in identifying task performance steps, skills, and knowledge necessary to perform the job.

TASK.

A unit of work activity which constitutes logical and necessary steps in the performance of a duty. A task has a definite beginning and ending point in its accomplishments and generally consists of two or more definite steps.

TASK ANALYSIS.

The process of reviewing elements of a job for the purpose of improving training program content across program levels of vocational technical education.

TASK LIST.

A list of tasks performed by incumbents in a specific occupational domain.

TEACHING ACTIVITIES.

Methods and/or procedures for delivering instructional content to students.

TEST-ITEM BANK.

A collection of criterion-referenced test items coded for input and retrieval by computer or manual methods.

VALIDATION.

The process of assuring that all aspects of an occupational task analysis identify the skills, knowledge, and attitudes performed in the occupation.

VERIFICATION.

The procedure of collecting data to substantiate an existing product; for example, task list verification.

V-TECS.

An acronym representing: Vocational-Technical Education Consortium of States; 795 Peachtree Street, N.E., Atlanta, Georgia 30365. A consortium of states that provide competency-based, vocational-technical education materials while conserving time and money through shared development and dissemination.

V-TECS CATALOG.

An incumbent-based description of the duties, tasks, performance objectives, performance guides, and related data in a specified occupation.

WORKING CONDITIONS.

The atmospheric and environmental conditions under which a worker performs a specific job.

WRITING TEAM.

A team of people representing instructors with subject matter expertise; persons having knowledge and experience in developing criterion-referenced measures; local or state supervisors in the domain being developed; workers and supervisors of incumbent workers whose function is to analyze occupational data and develop performance objectives for specific D.O.T. areas.

APPENDIX C
TOOLS/EQUIPMENT LIST

APPENDIX C
TOOLS/EQUIPMENT LIST

Air tank with air
Ammeter, split-core
Amprobe
Bench
Broom, 24 inch push
Broom, corn
Broom, whisk type
Brush, dusting
Brush, fiber
Brush, glue
Brush, steel
Brush, wire
Brush/yarn pad
Bucket
Buff/scrub machine
Buffer
Caulking gun
Chalk line
Chisel, cold
Chisel, wood
Chuck key
Cloth, cleaning
Cloth, drop
Continuity tester
Crowbar
Cultivator, core type
Cutter, glass
Cutter, tube
Cutters, wire
Deburring tool
Drag mat
Drill, portable
Drills (assortment)
Dust pan
Fertilizer applicator
Fertilizer injector
Fertilizer spreader
File
Fire extinguisher, Class A
Fire extinguisher, Class B
Fire extinguisher, Class C
Fire extinguisher, Class D
Floor scrubber
Folding rule
Fuse puller
Gauges, feeler
Gloves, rubber
Gloves, work
Grinder, electric

Gun, grease
Gun, hot glue
Gun, warm air heat
Hacksaw
Hammer, ball peen
Hammer, claw type
Heater, asphalt type
Hex head socket set (small)
Hose, garden (with nozzle)
Knife, hook blade
Knife, linoleum
Knife, putty
Knife, roofing
Knife, utility
Knife, wide putty
Ladder, extension
Ladder, single
Ladder, step
Level, 4 foot
Liter box
Mixing container
Mop bucket with wringer
Mop, carpet
Mop, floor finish
Mop, treated swivel dust
Mop, wet type
Mower, vertical
Nail puller
Nail set
Notcher, gasket
Ohmmeter
Oil can
Overseeder/diskseeder
Pail, 14 quart
Paintbrush
Pencil
Pick
Plane, smooth
Planer
Pliers, needle nose
Plumb bob/level
Plumber's snake/stick
Pneumatic system with air compressor
Power auger
Protective clothing
Pry bar
Punch, center
Push stick
Rag, drying
Rake
Rip fence
Roller
Roller, floor
Rolling pin

Rubber clothing
Sanding block
Sandpaper (various grades)
Saw horse
Saw, band
Saw, hand (crosscut)
Saw, miter
Saw, portable power (with ripping gauge)
Saw, radial arm
Saw, table
Scaffolding
Scissors
Scraper
Scratch awl
Screw extractor
Screwdriver, blade type
Screwdriver, Phillips
Scrub pad, swivel type with handle
Shampoo machine
Shovel
Snips, tin
Sponge
Spotting chart
Sprayer
Square
Square, framing
Squeegee
Stapler, gasket
Steel wool (various grades)
Straight edge
Sweeper, push
Tape, measure
Test gauge, continuity
Thermometer
Tool box, mechanic's (hand tools)
Towel, terry cloth
Trouble light
Trowel
Trowel, notched
Vacuum cleaner
Vacuum cleaner, heavy duty
Vacuum cleaner, wet/dry
Vise
Volt-ohm meter
Voltmeter
Warning sign
Wax/sealer applicator
Wire probe
Wire strippers
Wrench, flat jaw pipe
Wrench, tap

APPENDIX D
SOURCES OF STANDARDS

APPENDIX D
SOURCES OF STANDARDS

1. Anderson, E.P. **Home Refrigeration and Air Conditioning**. Indianapolis: Theodore Audel & Company, Division of Howard W. Sams & Company, Inc., 1975.
2. Brainard, Alason D. **Handbook for School Custodians**. University of Nebraska Press, 1961.
3. Brumbaugh, F.E. **Heating, Ventilating and Air Conditioning Library**, Vol. 2. Indianapolis: Theodore Audel & Company, Division of Howard W. Sams & Company, Inc., 1976.
4. **Building Repairer V-TECS Guide**. Vocational Technical Education Consortium of States, Commission on Occupation Education Institutions, 1866 Southern Lane, Decatur, GA 30033.
5. Emmons, R. **Turfgrass Science and Management**. Albany, NY: Delmar Publishers, 1984.
6. Higgins, Charlie W. **Spray Systems: Ready Aid for Cleaning Demands**. *Cleaning Management*, May-June, 1975.
7. Illinois Writing Team.
8. Jansen, Ralph F. **Developing Troubleshooting Skills; Trainee's Guide**. Barrington, IL: TPC Training Systems, Division of Technical Publishing Company, 1974.
9. Kingsolver, R.G. **Custodial Trades, Electrical Equipment Maintenance for Building Custodians, Electrical Maintenance II**. Kansas State Teachers College, Emporia, KS, 1957.
10. ----- **Custodial Trades, Electrical Equipment Maintenance for Building Custodian I**. Kansas State Teachers College, Emporia, KS, 1957.
11. Kirk, F.W., and N.R. Rimboi. **Instrumentation**, 3d ed. Chicago, IL: American Technical Society, 1975.
12. Oberg, E., and F.D. Jones. **Machinery's Handbook**, 21st ed. New York, NY: Industrial Press, Inc., 1979.
13. Ohio State University College of Education. **Custodial Training**. Ohio Trade and Industrial Education Service, 1962.
14. Turgeon, A., J. Street, F. Giles, M. Schurtleff, and R. Randell. **Illinois Lawn Care and Establishment**, (circular 1082). Urbana, IL: Cooperative Extension Service, University of Illinois at Urbana-Champaign, 1980.
15. West Virginia Writing Team.

APPENDIX E
BIBLIOGRAPHY

APPENDIX E

BIBLIOGRAPHY

- Althouse, A. D., C. H. Turnquist, and A. F. Bracciano. **Modern Refrigeration and Air Conditioning**, 5th ed. South Holland, IL: Goodheart-Willcox Company, Inc., 1988.
- Ashton, F., and A. Crafts. **Modes of Action of Herbicides**, 2d ed. Somerset, NJ: John Wiley & Sons, Inc., 1981.
- Baker, G. **Carpentry Fundamentals**. Atlanta, GA: Gregg Division, McGraw-Hill Book Company, 1981.
- Ball, V. **Ball Redbook Greenhouse Growing**, 14th ed. Reston, VA: Reston Publishing Company, Inc., 1985.
- Blankenbaker, E. K. **Modern Plumbing**, 3d ed. South Holland, IL: Goodheart-Willcox Company, Inc., 1988.
- Boodley, J. **The Commercial Greenhouse**. Albany, NY: Delmar Publishers, Inc., 1981.
- Bubel, N. **Seed - Starter's Handbook**. Emmaus, PA: Rodale Press, 1978.
- Builder Inc., **Rate Training Manual**. Naval Training Command, NAVTRA 10649-F, 1973.
- Conway, G. **Pest and Pathogen Control: Strategy, Tactics and Policy Models**. Somerset, NJ: John Wiley & Sons, Inc., 1984.
- Curtis, P., and R. Courson. **Outline of Soil Fertility and Fertilizers**. Champaign, IL: Stipes Publishing Company, 1981.
- Do-It-Yourself Encyclopedia**. Popular Mechanics. NY: Hearst Direct Books, 1986.
- Emmons, R. **Turfgrass Science and Management**. Albany, NY: Delmar Publishers, 1984.
- Feirer, J. L. **Cabinetmaking and Millwork**, 5th ed. Mission Hills, CA: Glencoe Publishing Company, 1988.
- Feirer, J. L., and G. Hutchings. **Carpentry and Building Construction**, revised. Peoria, IL: Bennett Publishing Company, 1981.
- Florman, M. **How to Clean Practically Anything**. Mount Vernon, NY: Consumers Union, 1986.
- Foth, H. **Fundamentals of Soil Science**, 7th ed. Somerset, NJ: John Wiley & Sons, Inc., 1984.
- Gladstone, B. **The Simon and Schuster Complete Guide to Home Repair and Maintenance**. NY: Simon and Schuster, 1984.

- Hartman, H., and D. Kester. **Plant Propagation Principles and Practices**, 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1983.
- Haskell, P. **Pesticide Application: Principles and Practices**. New York, NY: Oxford University Press, 1985.
- Higgins, C. W. **Spray Systems: Ready Aid for Cleaning Demands. Cleaning Management**, May-June, 1975.
- Israelson, O., and V. Hansen. **Irrigation Principles and Practices**. Fort Atkinson, WI: Nasco Publishing Company, 1980.
- Jansen, Ralph F. **Developing Troubleshooting Skills, Trainee's Guide**. Barrington, IL: TPC Training Systems, Division of Technical Publishing Company, 1974.
- Johnson, Harold V. **General Industrial Machine Shop**, 3d ed. Peoria, IL: Bennett Publishing Company, 1979.
- Kingsolver, R.G. **Custodial Trades, Electrical Equipment Maintenance for Building Custodians, Electrical Maintenance II**. Kansas State Teachers College, Emporia, KS, 1957.
- Lander, J. M. **Home Repair and Maintenance**, 1st ed. South Holland, IL: Goodheart-Willcox Company, Inc., 1986.
- Langhans, R. **Greenhouse Management**. Fort Worth, TX: Bransh-Smith Publishing, 1983.
- Lawns & Ground Covers**. Menlo Park, CA: Sunset Books, Lane Publishing Company, 1979.
- Ludwig, O. A. **Metalwork, Technology and Practice**, 6th ed. Bloomington, IL: McKnight Publishing Company, 1975.
- MacCaskey, M. **Lawns and Ground Covers: How to Select, Grow, and Enjoy**. Tucson, AZ: HP Books, 1982.
- McCarthy, W. J. **Machine Tool Technology**, 3d ed. Mission Hills, CA: McKnight and McKnight Publishing Company, 1968.
- McVickar, M., and W. Walker. **Using Commercial Fertilizers**. Danville, IL: The Interstate Printers & Publishers, Inc., 1978.
- Miller, R. **Industrial and Residential Electricity**, 3d ed. Mission Hills, CA: Glencoe Publishing Company, 1988.
- Moore, A. C. **How to Clean Everything; an Encyclopedia of What to Use and How to Use It**. NY: Simon and Schuster, 1968.
- National Electrical Code**. Quincy, MA: National Fire Protection Association, 1983.
- Nelson, K. **Flower and Plant Production in the Greenhouse**. Danville, IL: The Interstate Printers & Publishers, Inc., 1978.

-----, **Greenhouse Management for Flower and Plant Production**. Danville, IL: The Interstate Printers & Publishers, Inc., 1980.

Nelson, P. **Greenhouse Operations and Management**. Reston, VA: Reston Publishing Company, Inc., 1978.

Oravetz, J. A. **Building Maintenance**, 2d ed. Indianapolis: T. Audel and Company, 1977.

Page, B., and W. Thomson. **Insecticide, Herbicide, Fungicide Quick Guide**. Fort Atkinson, WI: Nasco Publishing Company, 1987.

Remodeling With Tile. Menlo Park, CA: Lane Publishing Company, 1978.

Sach, T. F. **A Complete Guide to Building and Plant Maintenance**, 2d ed. Englewood Cliffs, NJ: Prentice Hall, 1987.

Swain, P., and W. Arrott. **Power Handbook**. New York, NY: McGraw-Hill Publishers, 1951.

Tisdale. **Soil Fertility & Fertilizers**, 4th ed. New York, NY: Macmillan Publishing Company, 1985.

Turgeon, A., J. Street, F. Giles, M. Scurtleff, and R. Randell. **Illinois Lawn Care and Establishment**, (circular 1082). Urbana, IL: Cooperative Extension Service, University of Illinois at Urbana-Champaign, 1980.

Wagner, W. H. **Modern Carpentry**. South Holland, IL: The Goodheart-Wilcox Company, Inc., 1969.

Ware, G. **Complete Guide to Pest Control**. Fresno, CA: Thompson Publications, 1980.

Woodin, J. C., and L. E. Hayes. **Home and Building Maintenance**. Bloomington, IL: McKnight and McKnight Publishing Company, 1969.

Yepsen, Jr., R. **The Encyclopedia of Natural Insect and Disease Control**. Emmaus, PA: Rodale Press, 1984.

Young, J. A. **Collecting, Processing and Germinating Seeds of Wildland Plants**. Portland, OR: Timber Press, 1986.